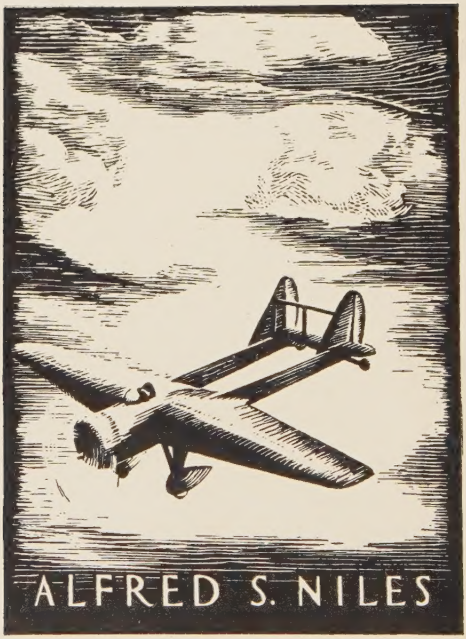
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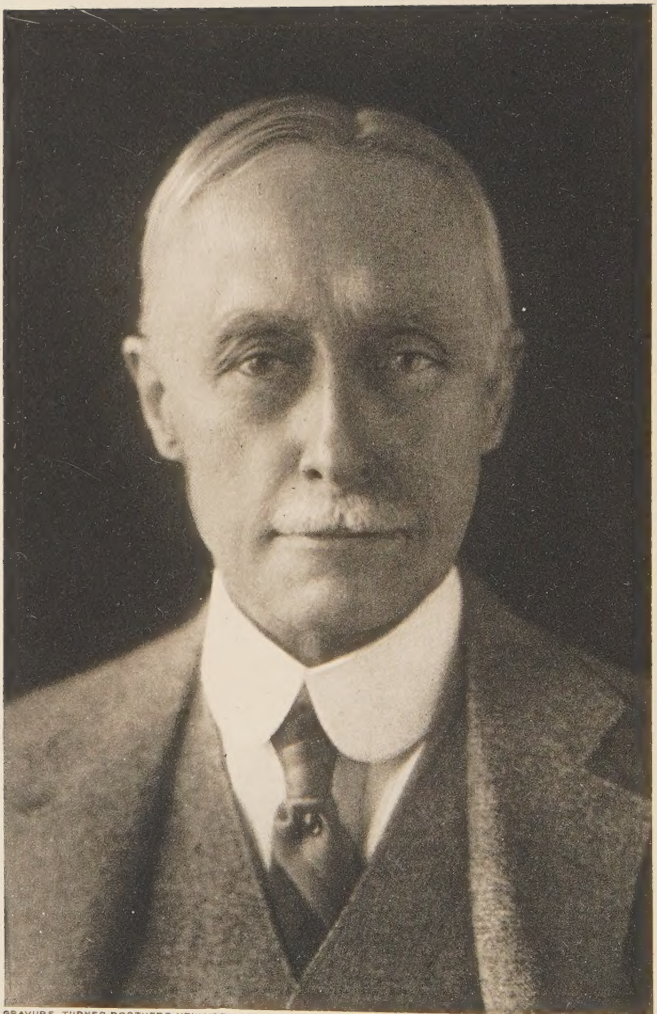

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Elmer A. Sperry.

PRESIDENT 1929
OF
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Record and Index

Volume 3—1929

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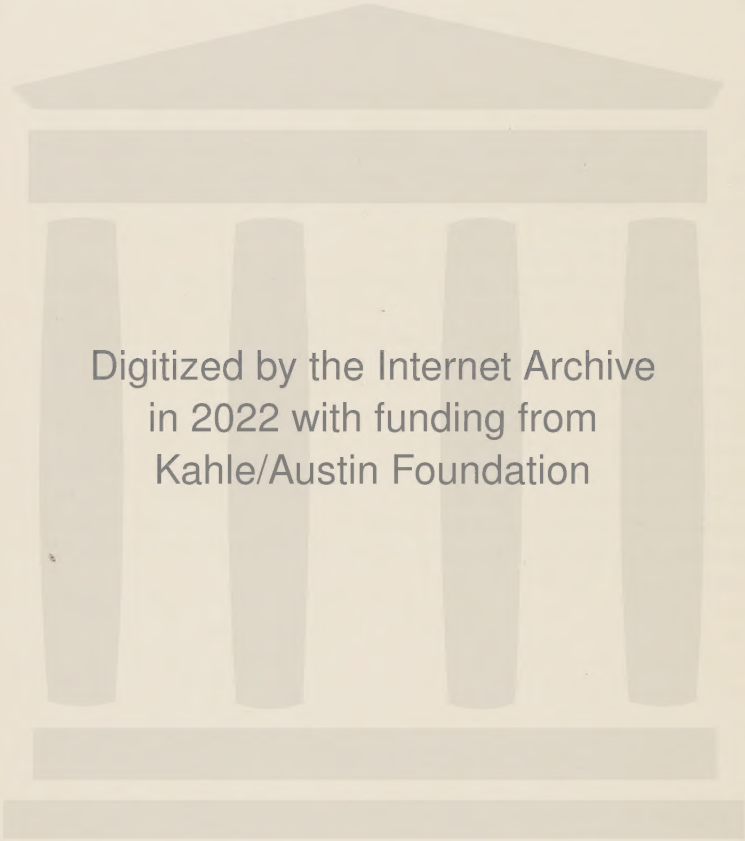
FOREWORD

A RECORD of the Society's activities for the year 1929 and a complete index of its publications will be found in this volume. Information concerning the organization and operation of the Society is of the year 1929 and is published as a matter of record. For such current information as the personnel of the Society's committees, officers, Professional Divisions, Local Sections, and the like, the Membership List should be consulted.

As a source book of Society affairs the Record and Index combines all of the reference material likely to be of permanent value and of interest to future searchers, and as an index it is a means of locating the technical information in the Society's publications. The index combines the separate indexes of the Transactions and of Mechanical Engineering, as well as references to reports and other technical publications of the Society which have appeared during the year.

Special care has been exercised in the preparation of the memorial notices that comprise the necrology with the conviction that some attention should be paid to significant events in the lives of deceased members, even though they may fall outside of the field of mechanical engineering.

W. A. SHOUDY, *Chairman,*
F. V. LARKIN,
W. H. WINTERROWD,
L. C. MORROW,
S. F. VOORHEES,
Publications Committee.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ELMER A. SPERRY

ELMER AMBROSE SPERRY, President of The American Society of Mechanical Engineers for the year 1928-1929, was born at Cortland, New York, on October 12, 1860. He attended the State Normal School of his native town and spent the college year 1879-1880 at Cornell University. His training, however, was attained mostly by his own efforts after leaving school. The honorary degree of Doctor of Engineering has been conferred upon him by the Stevens Institute of Technology and Lehigh University, and that of Doctor of Science by Northwestern University.

In 1879, when not yet twenty years old, he perfected one of the first electric arc lights and secured its practical adoption. In 1880, he founded the Sperry Electric Company of Chicago, and manufactured arc lamps, dynamos, motors, and other electrical appliances. In 1883 he erected on Lake Michigan an electric beacon 350 ft. high, the highest in the world, and equipped it with 40,000 candlepower of arc lights.

In 1888 he was the first to build electrical mining machinery. His machines have been widely used, and started a distinct advance in mining.

About 1890, he became a designer of electric street-railway cars and soon founded the Sperry Electric Railway Company of Cleveland, Ohio, to build them. In 1894 the patents were purchased by the General Electric Company. He then designed electric carriages and manufactured them for several years. In 1896 he drove the first American-built automobile in Paris. A number of his electric carriages were sold there.

Electrochemistry also interested Mr. Sperry. He originated a process for caustic soda and bleach which still continues to be used extensively because a second large plant has recently been put into operation. Under other Sperry patents the National Battery Company was organized. He invented a detinning process for recovering tin from old cans and scrap, and an electrolytic process for producing white lead from wastes of copper mines.

He invented machinery for producing fuse wires. On this invention the Chicago Fuse Wire Company was established.

[EDITOR'S NOTE.—Subsequent to the preparation of this biography and prior to its publication, Mr. Sperry, on June 16, 1930, died from complications following an operation for gallstones.]

In 1918, Mr. Sperry announced his high-intensity arc searchlight, having a brightness 500 per cent greater than that of any light previously made. It has high actinic value and has made possible indoor photographing of motion pictures without the sun. It is a great aid in the navigation of air and water, and is the standard searchlight for the principal armies and navies of the world.

Mr. Sperry has devoted much thought, energy, and money to the development of compound internal-combustion engines using low-grade fuel oil. His compound Diesel engine for a given horsepower has about one-fifth the size and weight of the ordinary types.

About 1896 Mr. Sperry turned his attention to making practical use of the principles underlying the toy known as the gyroscope. This amazing device appears to have been invented some time in the eighteenth century. It was studied scientifically by Foucault, a French physicist, about 1851. The gyroscope is a wheel with a heavy rim, so mounted that it can spin very rapidly on its axis. When friction is reduced to a minimum and the method of mounting and suspending eliminates restraint by other objects or external forces, the gyroscope tends to point its axis in a definite direction and to return to that direction if disturbed. Possibilities of great usefulness were perceived. By diligent, tedious, and expensive investigation and great ingenuity, overcoming many obstacles, Mr. Sperry skilfully combined electrical and mechanical elements into successful gyroscopic compasses and stabilizers for ships and airplanes. Other applications of the gyroscope followed. The inventions were great contributions to safety and comfort of navigation of the seas and the air. In some respects they are the most distinctive productions of a remarkably prolific inventor.

Mr. Sperry was president of the Sperry Gyroscope Company, New York, organized in 1910 to manufacture the gyrocompass, ship and airplane stabilizers, high intensity searchlights, fire-control apparatus, internal-combustion engines, and other products invented by him. He is now president of the Sperry Development Company, Brooklyn, N. Y., and also a director of the Goodman Manufacturing Company, Chicago, Ill.

Mr. Sperry has more than four hundred patents. For nearly fifty years he has been an unusually productive worker in a surprisingly wide area of science and engineering. Many honors have been conferred upon him for his achievements. In 1914 he was awarded the the First Prize of the Aero Club of France for his airplane stabilizer. In that year he also received the John Scott Legacy Medal and Premium awarded by the Franklin Institute. Other awards include the Collier Trophies in 1915 and 1916; the John Fritz Medal, 1927; the Holley Medal, 1927; the Albert Gary Medal of the American Iron and Steel Institute, 1929; the Elliott Cresson Medal of the Franklin Institute, 1929; two decorations from the Emperor of Japan,

the Order of the Rising Sun and the Order of the Sacred Treasure; two decorations from the last Czar of Russia; and the Grand Prize, Panama Exposition.

Mr. Sperry is a member of the United States Naval Consulting Board and Chairman of the Division of Engineering and Industrial Research of the National Research Council. He is a founder member of the American Institute of Electrical Engineers and the American Electrochemical Society; a life member of The American Society of Mechanical Engineers, which he joined in 1910; and past-president of the New York Electrical Society. He also belongs to the American Chemical Society, the Society of Naval Architects and Marine Engineers, of which he is a member of Council, Society of Automotive Engineers, American Petroleum Institute, American Association for the Advancement of Science, National Academy of Sciences, Edison Pioneers, National Aeronautic Association, Franklin Institute, and other technical and scientific organizations in this country. He is an honorary member of the Japanese Society of Mechanical Engineers, the Japanese Society of Naval Architects, the Japanese Society of Electrical Engineers, and the Engineering Association of Hawaii. He is a member of the Engineers Club of New York as well as of numerous other social organizations.

Mr. Sperry is credited with having originated the World Engineering Congress in Japan in 1929. He was elected chairman of the American Committee, of which Mr. Hoover was honorary chairman. At the Congress he was elected an honorary vice-president, and as leader of the American delegation took a very active part in the program.

GENERAL INFORMATION

GENERAL INFORMATION

AS ITS interests broaden and its activities increase, the presentation of information concerning the Society through every available source becomes increasingly important. Each unit of the organization feels this responsibility and endeavors to discharge it not only through the channels of the *A.S.M.E. News* but also by issuing such pamphlets as those on "A.S.M.E. Technical Committees," "Research Activities," and "Student Branches." Copies of these pamphlets are freely distributed and may always be obtained from the headquarters of the Society upon request.

For those who prefer one source for complete information, the following pages have been prepared. Part 1 renders in non-legal language the import of the Constitution, By-Laws, and Rules of the Society, for easy reference use in matters pertaining to the organization of the Society and its activities. It also contains certain information of historical nature, such as the lists of recipients of awards and portions of the matter concerning research, standardization, etc. Part 2, beginning on page 53, presents the personnel of the Council and standing and special committees, and A.S.M.E. representatives on joint activities for 1929; lists of Professional Divisions, Local Sections, and Student Branches, with names of chairmen; lists of professional (technical) committees and of organizations which cooperate with them; a summary of membership; and lists of honorary members and past officers of the Society.

PART 1

THE ORGANIZATION OF THE SOCIETY

The American Society of Mechanical Engineers was founded in 1880 and chartered under the laws of the State of New York in 1881. Its headquarters are located in the Engineering Societies Building at 29 West 39th Street, New York, N. Y.

Objects

The objects of this Society are to promote the art and science of mechanical engineering and the allied arts and sciences; to encour-

age original research; to foster engineering education; to advance the standards of engineering; to promote the intercourse of engineers among themselves and with allied technologists; and severally and in cooperation with other engineering and technical societies to broaden the usefulness of the engineering profession.

Constitution, By-Laws, and Rules

A new Constitution was adopted in 1922 and amended in 1924 and 1926. The By-Laws and Rules have been correspondingly revised. The complete Constitution, By-Laws, and Rules appear elsewhere in this volume.

Administration

directors (council) and officers, and their election

The Society is governed by a board of directors styled "The Council," subject to the limitations of the Constitution. The Council consists of twenty-two members elected by letter-ballot of the membership of the Society from nominees selected by the Regular Nominating Committee.

The officers of the Society consist of the President, the Vice-Presidents, and the Treasurer. The Treasurer, and also the Secretary, are appointed by the Council.

The Council and officers for 1929 are listed on pages 53-54.

The *Regular Nominating Committee* is selected annually by delegates of the Local Sections to the Annual Meeting and is confirmed by the Society in open session at this meeting. The Nominating Committee solicits suggestions from the membership for nominees for the Council and makes its selection after conferences and open sessions at the Semi-Annual Meeting. A special Nominating Committee having the same powers may be organized by any group of one per cent of the membership of the Society, as provided in the By-Laws.

The Regular Nominating Committee for 1929, together with the grouping of the Local Sections through whose delegates it was selected, is given on page 57.

committees

The Council is assisted by sixteen administrative and professional (technical) standing committees, represented without vote on the Council by their chairmen. Other Special Committees are appointed from time to time on the recommendation of a Meeting of the Society or of a Standing Committee of the Council, or by the Council itself.

The *Finance Committee*, the personnel of which for 1929 is given on page 54, has supervision of the financial affairs of the Society.

These cover the receipt and disbursement of funds, including moneys received from the membership, income secured from the sale of publications, contributions for special purposes, such as research and standardization, and special trust funds.

The *Committee on Constitution and By-Laws,* under direction of the Council, has supervision of matters affecting the Constitution, By-Laws, and Rules, and reports on all matters in this connection referred to it by the Council. It does not institute policies. The personnel of this committee for 1929 will be found on page 55.

Subsequent pages present information concerning the work and personnel of other committees.

MEMBERSHIP

All matters of admission of new members, of transfer of members from one grade to another, and of terminations of membership are in charge of the Membership Committee under the direction of the Council. The personnel of the committee for 1929 is given on page 54. A summary of membership, corrected to January 2, 1930, will be found on pages 82-83.

The constitutional requirements for admission to the Society are included in Article C4, Sections 3 to 6, of the Constitution.

Application for Admission

Application for admission must be made upon a form which may be obtained from the Secretary or from officers of Local Sections. This form provides for a statement of the education and professional experience of the applicant and references from members of the Society who have personal knowledge of the engineering experience of the applicant; the number of references depending upon the grade of membership desired. Local Sections officers will cooperate with members desiring to assist engineers making application for membership in the Society.

Procedure for Election

Upon receipt of an application by the Secretary, the name and occupation of the applicant is posted in the *A.S.M.E. News,* and members of the Society are given a twenty-day period within which information regarding him may be forwarded to the Membership Committee. During this period statements are secured from those members named by the candidate for references, and the Executive Committee of the Local Section to which he would logically be assigned may also be consulted concerning his qualifications.

The Membership Committee then considers all information received, and if the applicant is found eligible for membership, his name is presented to the Council by letter-ballot, with the recommendation of the Committee specifying the grade of membership for which he is qualified. The Council votes on the application within thirty days after the letter-ballot is sent, and candidates receiving the approval of the Council are notified of their election.

An initiation fee and dues for the remaining portion of the Society's fiscal year, which begins on October first, are payable upon notice of election; thereafter dues are payable annually in advance on the first of October. Upon acceptance of election by payment of the initiation fee and dues, a new member is assigned to the Local Section nearest him.

Membership Privileges

The benefits of membership depend in a large measure on the amount of personal interest taken by the individual. The dues in themselves entitle the member to the following publications: The sections of Transactions for those Professional Divisions in which he is registered; the monthly journal of the Society, *Mechanical Engineering;* the semi-monthly *A.S.M.E. News;* and the annual Record and Index, Membership List, and Mechanical Catalog; the right to wear the official badge of the Society, which may be purchased from the Secretary; and the privilege of using with his name the approved abbreviations denoting his connection with the Society, as follows:

Honorary Member	Hon. Mem. A.S.M.E.
Member	Mem. A.S.M.E.
Associate	Assoc. A.S.M.E.
Associate-Member	Assoc-Mem. A.S.M.E.
Junior	Jun. A.S.M.E.

A member who puts *himself* into the Society by attending meetings, serving on committees, both national and local, presenting papers or taking part in discussions, etc., receives a return on his investment, which, in the opinion of some of the older members, is of inestimable value.

INSIGNIA

The design of the seal of the Society is based on the saying which is attributed to Archimedes δὸς που στῶ καὶ τὸν κόσμον κινήσω (Give me where to stand and I will move the earth).

At its meeting on May 14, 1928, the Council voted that the seal of the Society or any representation of it should be used only on official publications of the Society, which are issued by definite or inferred authorization. Such publications include the regular publi-

cations, such as *Mechanical Engineering*, Membership List, Transactions reprints, *A.S.M.E. News*, Record and Index, The Engineering Index, Boiler Code, Power Test Codes, and the other approved standards, and programs of Annual, Semi-Annual, and other general meetings of the Society.

The official badge of the Society is a four-leaf clover design bearing the Society's initials. The badge for Honorary Members, Members, Associate-Members, and Associates is in dark blue enamel, with letters in bright gold. The Junior badge is in crimson enamel. Student Associates may wear a student pin, which combines the Society's official badge and the colors and initials of his college.

The badge is supplied in two sizes, the small one being the size here shown, and the large about twice this size. Forms of the large size are catch-pin back for wearing on coat lapel or vest and double-faced charm for watch fob or chain. Forms of the small size are catch-pin back and screw back. Prices of the official badge may be obtained from the Secretary.

MEETINGS

Through its meetings the Society offers opportunities for members to gather and discuss the latest developments and newest thought in mechanical engineering and to gain the stimulus of contact, the excitation of one's mental processes, that come from personal participation in the activities of his professional group. Not the least of the advantages which attendance at a meeting gives is the excellent opportunity for making friendships and developing professional fellowship.

The Committee on Meetings and Program, which is listed on page 54, has supervision of the Annual, Semi-Annual (Spring) and other general meetings of the Society and cooperates with the Professional Divisions and the Committee on Local Sections in regard to the National Meetings of the Divisions. The meetings held during 1929 are reported elsewhere in this volume.

Scope

The broadening scope and activity of the Society is reflected in the programs for Society meetings, which include not only technical sessions, entertainment and excursion events, but many committee meetings, public hearings, and gatherings of allied bodies. The meetings are the great clearing houses of experience and knowledge in the mechanical-engineering field, and every member is sure to find much of interest and inspiration in the programs.

There are several classes of Society meetings, each designed to satisfy a particular need.

Annual and Semi-Annual Meetings

The Annual and Semi-Annual Meetings still carry out their original purpose of bringing together all phases of mechanical engineering in a program which will give a free interchange of information between the specialists and will provide an opportunity for emphasizing the unity of the mechanical engineering profession and for developing a progressive program for the entire group.

The Annual Meeting, as specified in the Constitution, must begin in New York and continue there during the annual election of directors, held on the first Tuesday in December. If occasion ever requires it may then be adjourned to some other city.

The date and place of the Semi-Annual (Spring) Meeting is determined by the Council.

A Business Meeting of the Society is always a part of each of these meetings.

Other Meetings of the Society

In the earlier days of the Society the Annual and Semi-Annual Meetings provided ample opportunities for gatherings of the members. But as the membership increased and spread, additional meetings in different localities were found advisable, and in 1923 the Council established the "Regional" Meetings. These have developed steadily until now their programs rank in character with those of the Annual and Semi-Annual Meetings. Their papers may deal with those problems of particular importance to the regions in which the meetings are held, where the industries do not come within the classification of any of the existing Professional Divisions of the Society.

National Divisional Meetings

For those engaged in the established specialties of mechanical engineering, the National Meetings of the Professional Divisions, authorized by the Council in 1926, are held in centers where the specialists of the Divisions may be present in large numbers.

Papers and Discussions for Meetings

That the high standard of the technical meetings may be maintained, papers submitted to the Society should as far as possible present (1) new facts, methods of procedure, or principles of undoubted value; (2) results of intelligently planned, original, experi-

mental researches; (3) important conclusions from known facts regarding any particular subjects reviewed by the author.

The preparation of a technical paper, complete with tables and illustrations, may be a complicated task. A pamphlet of suggestions to authors, which may be had upon application to the Secretary, will be found of considerable assistance, and these, if followed, will greatly reduce the amount of editorial work necessary on a paper and will expedite its publication.

As the technical sessions are generally arranged in cooperation with the Professional Divisions of the Society, papers may be submitted through the various Divisions or directly to the Secretary of the Society, who will refer them to the proper Divisions.

Manuscripts must be submitted at least two months before the meeting at which the paper is to be presented. This allows the time necessary for having them preprinted and distributed for discussion, which is essential to the success of a technical session. Discussion to be valuable must be directly pertinent to the subject of the paper. It should be concise and definite. Its purpose should be either to confirm or to correct, in the light of personal experience, definite results or conclusions which the author of the paper has presented.

PUBLICATIONS

The Society's publications, the most obvious service to the member, perform an important function in carrying out the purposes of the Society. They announce and record its activities, technical and professional, completed or proposed; they are the means of communication between the active committees and the remainder of the membership, as well as the source of information and inspiration in carrying out the broad program of the Society.

The personnel of the Publications Committee, which has supervision of publications, is given on page 54.

Transactions

The Transactions, containing selected papers and discussions presented at meetings of the Society and of its Divisions and Local Sections, is issued in sections. The material is grouped according to the special interests of the Professional Divisions of the Society, and the sections are distributed on the basis of registration in Professional Divisions. Members with varied interests are permitted to register in a maximum of three Divisions and receive the Sections of Transactions covering those Divisions. Synopses of all papers appear in current issues of *Mechanical Engineering*, and individual copies may be obtained from headquarters, at a price, as long as the supply lasts, or

may be consulted in a complete Transactions in the nearest library depository, a list of which is given elsewhere in this volume.

Mechanical Engineering

Mechanical Engineering, published monthly, contains original contributions, addresses, papers, and discussions presented or to be presented at meetings of the Society, and of current value; abstracts of the Transactions papers of more general interest; editorials by engineers upon subjects of timely interest; abstracts of important articles appearing in current issues of the world's technical press; The Engineering Index, a well-known technical service; the Conference Table, a department designed to allow members to exchange information and opinions with other members; correspondence on matters of engineering interest; synopses of all papers appearing in the Professional Division Sections of Transactions; book notes of the Engineering Societies Library, reviews by experts, etc.

Mechanical Engineering is mailed to every member in good standing on the twenty-fifth of the month preceding the month of issue.

A.S.M.E. News

The *A.S.M.E. News*, published semi-monthly, is a convenient method of informing members upon all current Society matters, including activities of Council, Committees, Professional Divisions, and Local Sections, members' correspondence, candidates for membership, positions and engineers available, etc.

The *News* is issued to members in good standing on the seventh and twenty-second of each month.

Record and Index

The Record and Index is published each year and distributed to all members in good standing on the thirty-first day of December of that year. For information as to the scope of the book, reference is made to the contents of the present volume. Particular attention is called to the index to publications, which provides a combined index to *Mechanical Engineering* and the Sections of Transactions for 1929, and other miscellaneous publications of the year.

Membership List

A Membership List, formerly known as the Year Book, is issued in February of each year to every member in good standing who requests it and contains the list of members arranged geographically and alphabetically, corrected to the first of January.

Mechanical Catalog

The Mechanical Catalog, formerly entitled Condensed Catalogues of Mechanical Equipment, is published annually and mailed about September 30 of each year to all members who have requested it. It contains a catalogue of mechanical equipment, classified into eleven main groups and arranged alphabetically according to manufacturers; a complete alphabetical subject directory to manufacturers of mechanical equipment; and a classified list of consulting engineers.

Biographies

Subscription editions of the lives of several engineers have been offered to members of the Society during the past few years. These books constitute important additions to the literature of the profession. The titles and dates of issue are as follows:

1912—Autobiography of John Fritz
(Trade Edition by John Wiley & Sons)
1921—A Life of George Westinghouse, By Henry G. Prout
(Trade Edition by Charles Scribner's Sons)
1923—Frederick W. Taylor, by Frank Barkley Copley
(Trade Edition by Harper & Brothers)
1924—John A. Brashear, an Autobiography
(Trade Edition by Houghton Mifflin Company)
1925—John Edson Sweet, by Albert W. Smith
1927—A Biography of Walter Craig Kerr, by Albert W. Smith
1928—John Stevens—An American Record, by Archibald Douglas Turnbull (Trade Edition by The Century Co.)
1929—Robert Henry Thurston, by William F. Durand

The Engineering Index

The Engineering Index Service offers weekly in card-index form concise digests of domestic and foreign technical periodicals covering every phase of engineering activity. Approximately 1,800 publications representing 37 countries and published in 18 languages are reviewed each week by a staff of experts operating under the supervision of the Publications Committee.

The Engineering Index is also published annually in book form, which includes, in 2,000 pages, the 50,000 references issued in the card service. The material is alphabetically arranged and copiously cross-referenced. The annual volume also provides a complete author index of 20,000 names.

Reprints, Reports, Codes, Etc.

Members may obtain from the Publications-Sales Department of the Society lists giving titles and prices of the various publications

that are on sale to members and others who desire them. These publications include reprints of papers presented before the Society, usually with the discussion, and reports of technical committees, including the Boiler Code, Power Test Codes, Safety Codes, and Standards.

PROFESSIONAL DIVISIONS

A Professional Division is an organization of members of the Society on the basis of common interest in a branch of engineering within the scope of the Society.

A Professional Division's principal function is the presenting and stimulating of developments in mechanical engineering in its field, principally through a four-point program of activities: (*a*) National Division Meetings; (*b*) Sessions at Society Meetings; (*c*) Annual Progress Report; and (*d*) Surveying for Research.

Membership

Any member of any grade may register in not more than three Professional Divisions. He will be kept informed of the activities of all Divisions by means of the publications and meetings of the Society, and will receive automatically the sections of Transactions containing all printed papers of the Divisions in which he has registered. Other papers may be secured upon request. Those who register in a Division should render active service in the Division.

Organization

The Standing Committee on Professional Divisions, listed on page 54, is the point of contact for the Divisions with the Council and with each other. It exercises general supervision over the work of all Divisions.

Each Division has an Executive Committee which is its administrative body. This committee consists of five members, each appointed for five years by the President of the Society, one member retiring each year. The Executive Committee plans the work of the Division, appoints such subcommittees as may be necessary to carry out the purposes of the Division, and directs their work. A list of the Professional Divisions, with the names of the chairmen of their Executive Committees, is given on page 58. The complete personnel of the executive committees and subcommittees of the Professional Divisions for 1929 was given in the Membership List for that year.

Four-Point Program of Activities

NATIONAL MEETINGS

The Professional Divisions are authorized to conduct National Meetings of the Divisions in cooperation with the Local Sections in the place of the meetings and with the Committee on Meetings and Program. Such meetings are intended to give all members of the Society who have a common interest in some particular phase of engineering the opportunity to meet and discuss the problems arising in that field.

SESSIONS AT SOCIETY MEETINGS

It is one of the duties of the Professional Divisions, in cooperation with the Committee on Meetings and Program, to aid in arranging the technical sessions for Annual, Semi-Annual, and other meetings which are functions of the Society as a whole. The Divisions also aid Local Sections in securing speakers and writers on specialized technical topics and those of general interest within the field of the Division.

ANNUAL PROGRESS REPORTS

Each Division prepares annually a Progress Report which gives an accurate account of mechanical engineering developments in its field. These Progress Reports are presented at the Annual Meeting and furnish information upon which a future program can be developed.

SURVEYING FOR RESEARCH

Each Professional Division conducts, usually through a subcommittee, a survey of its field as to the need of research, standardization, and test codes. A Division is in a position to learn of the existing gaps in knowledge and of the steps that are under way to fill these gaps.

Where a particular project appears desirable, it is the duty of the Division to demonstrate the need for it, canvass the personnel and research laboratories which should be interested in it, and cooperate with the Standing Committee on Research in presenting a definite project to the Council.

General Service

Each Professional Division endeavors to have active cooperative relations with other technical societies or trade associations touching on the field of the Professional Division so as better to coordinate activities in its field. Many Divisions have other functions, in the

form of general service to the public or to the engineering profession. Excellent examples of this are: the smoke abatement work of the Fuels Division and the elimination of waste campaign of the Management Division.

Divisions may also sponsor prizes for papers of merit presented before their meetings or may establish awards under the auspices of the Society for outstanding achievements in their fields. The Aeronautic Division is awarding annually prizes to students for the best papers prepared on civil aeronautics and in cooperation with the St. Louis Section established in 1929 an award of the Society to be known as the Spirit of St. Louis Medal, details concerning which are given on page 27.

LOCAL SECTIONS

A Local Section is an organization of the members of the Society in a given territory whose objects are to promote the professional ideals of the Society, as well as to stimulate personal contact and acquaintanceship among the members in the territory.

The members have now organized Local Sections in seventy-one important industrial centers throughout the country, as listed on pages 59-60. The 1929 personnel of the executive committees, date of organization, meeting place, affiliated organizations, and other data regarding each of the localities where Sections are established, were given in the 1929 Membership List. The personnel of the Standing Committee on Local Sections, which has supervision of the Local Sections throughout the country, appears on page 55.

In addition to their professional and social activities, these Sections participate in the government of the whole Society. Each Section sends a representative to a Conference of Local Sections' delegates held during the Annual Meeting in New York, at which the Regular Nominating Committee for officers of the Society is selected.

Each Section is allotted a territory dependent upon the population and geography of the portion of the country in which it is situated. The membership of the Section selects by vote an executive committee and other officers. This executive committee, or the chairman thereof, has the power of appointing subcommittees. The activities of the Section are financed through an appropriation from the funds of the Society.

Members of the Society, no matter where located, are assigned to Local Sections without being obligated to pay dues in addition to those of the Society. Dues which may be assessed by Sections themselves on their members to provide for greater activities are not mandatory.

Organization of a New Section

After obtaining the Council's approval of a Section, a group of members call for an organization meeting of all members of the A.S.M.E. of the locality, and temporary officers are chosen to take charge of the Section's activities.

Contacts and Activities

Through the Sections, the activities of the Society are brought to the door of the members. Through local subcommittees there is opportunity for contact with all of the units of the Society, including its various Professional Divisions, Student Branches, technical committees engaged in research, standardization, and the development of codes outlining standard professional practice, etc. Incidentally, through the Sections, opportunities are provided for contact with the activities of other organizations and societies, such as the American Engineering Council, National Research Council, the preparedness movement of the Army and Navy of the United States, and professional allied organizations. Participation is also afforded in engineering movements of a national character, such as laws for the licensing and registering of engineers.

Local Engineering Societies

Because of the multiplicity of engineering organizations, Local Sections are encouraged to affiliate with local engineering societies in order to avoid a duplication of effort and conflict in meeting dates, and at the same time enable the national societies through their respective local sections in the various cities of the country to support both morally and financially the development of local engineering activities. This procedure provides concerted action in each community by engineers of all branches of the profession.

Meetings

With the great increase in the number of members of the Society all over the United States, the need for more than two yearly meetings of national importance has become evident. This has resulted in the authorization of Council of other meetings of the Society similar to the Annual and Semi-Annual Meetings, and partially financed from national funds. The several Local Sections of any region where such a meeting is held cooperate in the development of its program and appoint a special local committee to conduct the meeting, as a subcommittee of the Committee on Meetings and Program.

Each Local Section also holds its own regular meetings, as well as joint meetings with Student Branches or other engineering organizations in its vicinity.

STUDENT BRANCHES

A group of students of mechanical engineering in a school or college of accepted standing may petition the Council for the formation of a Student Branch of the Society or for the affiliation of an established student engineering society with the A.S.M.E. Mechanical engineering students in such societies, as well as members of Student Branches, shall be regarded as Student Associates of the A.S.M.E. A student in an engineering college or technical school where there is no Student Branch may be accepted as an Enrolled Student of the Society.

The object of the formation of Student Branches is to enable the engineering student to obtain a conception of the organization and operation of engineering societies, and therefore, outside of a few simple rules, Student Branches enjoy almost complete autonomy.

A Student Branch may be established in an engineering school which has the following requirements: A preparation for entrance of four years at high school or its equivalent; an adequate staff for teaching mechanical engineering; at least one member of the faculty a member of the Society; an equipment of buildings and laboratories sufficient to make possible a responsible professional course in mechanical engineering; a course of studies covering all subjects ordinarily required to enable a graduate to begin a career in engineering.

Activities and Privileges

Student Branches have opportunity to cooperate in a number of the Society's activities. They are encouraged to hold joint meetings with other Student Branches or with Local Sections of the Society in their vicinity. Student Associates are accorded the same privileges as A.S.M.E. members in the matter of securing a discount on publications purchased from the Society. In order to encourage the writing and presenting of papers by students, the Society, through the generosity of two of its members, has been able to offer each year awards, accompanied by certificates of award, for the best papers submitted by Student Associates.

The meetings of the Branch afford the student an opportunity for the development of the art of public speaking on engineering subjects. He also has the privilege of wearing a student pin, combining the Society's official badge and the colors and initials of his college, and of using a membership card for introduction to engineering plants where members of the Society may be in authority and to serve as a

means of identification at engineering meetings and elsewhere. He enjoys the privilege of attending the general meetings of the Society, going on excursions, and participating in other invitation features afforded to regular members. Upon graduation, he is assisted in securing employment and forming contact with engineers of the United States or other countries.

The personnel of the Committee on Relations with Colleges, which has supervision of the Student Branches under the direction of the Council, is given on page 55. The list of Student Branches, numbering ninety-nine, with the names of their honorary chairmen for 1929, appears on pages 60-62.

AWARDS

The Committee on Awards, given on page 55, has supervision of the awards of the Society under the direction of the Council. Awards and special funds are administered as specified in the deeds of gift or as may be determined by the Council from time to time. The following awards come within the jurisdiction of the Society:

Honorary Membership, to which persons of acknowledged professional eminence are elected by unanimous vote of Council under the provisions of the By-Laws and Rules. A list of honorary members is given on page 77.

Life Membership, which may be conferred by the Council for distinguished service to the Society.

A.S.M.E. Medal, established by the Society in 1920 to be presented for distinguished service in engineering and science. May be awarded for general service in science having possible application in engineering.

Holley Medal, instituted and endowed in 1924 by George I. Rockwood, Past Vice-President of the Society, to be bestowed for some great and unique act of genius of engineering nature that has accomplished a great and timely public benefit.

Melville Medal, established in 1914 by the bequest of Rear-Admiral George W. Melville, Honorary Member and Past-President of the Society, to be presented for an original paper or thesis of exceptional merit, presented to the Society for discussion and publication, to encourage excellence in papers. May be presented annually.

Spirit of Saint Louis Medal, endowed by members of the Society and citizens residing in St. Louis, Mo., to be awarded for meritorious service in the field of aeronautical engineering. This medal will be awarded at the discretion of the Council of the Society at approximately three-year periods upon the recommendation of a Spirit of Saint Louis Medal Board of Award made up of six members, each appointed for a term of nine years and the terms of two members expiring at each three-year period.

Junior Award, annual cash award of $50, established in 1914, from a fund created by Henry Hess, Past Vice-President of the Society, to be presented, together with an engraved certificate, for the best paper or thesis submitted by a Junior Member.

Student Awards, two annual cash awards of $25 each, established in 1914, from a fund created by Henry Hess, Past Vice-President of the Society, to be presented, together with engraved certificates, for the best papers or theses submitted by Student Associates.

Charles T. Main Award, annual cash award of $150, established in 1919 from a fund created by Charles T. Main, Past-President of the Society, to be awarded to a student of engineering, preferably a member of a Student Branch of the Society, for the best paper within the general subject of the "Influence of the Profession upon Public Life." The exact subject is assigned by the Committee on Awards, subject to the approval of the Council, and is announced each year through the Honorary Chairmen of the Student Branches.

Scholarships and Loan Funds

Max Toltz: Loan Fund of $15,000 established by Major Max Toltz, former member of the Council of the Society, the income to be used for assistance to students.

John R. Freeman: Fund of $25,000 established in 1926 by John R. Freeman, Past-President of the Society, the income to be used for travel scholarships and research.

Woman's Auxiliary: Scholarship or Fellowship offered by the Woman's Auxiliary to the Society to assist sons and daughters of members or worthy students of mechanical engineering.

The names of the recipients of the different awards to date are given in the following lists, together with the dates of presentation, and the services or papers for which the awards were made. There were no awards for the years not listed.

A.S.M.E. Medal

1921 Hjalmar Gotfried Carlson, "in recognition of the services rendered the Government because of his invention and part in the production of 20,000,000 Mark III drawn steel booster casings used principally as a component of 75-mm. high-explosive shells, but also extensively in gas shells and bombs."

1923 Frederick Arthur Halsey, "for his paper describing the premium system of wage payments presented before the Society at the Providence Meeting in 1891, as the adoption of the methods there proposed has had a profound effect toward harmonizing the relations of worker and employer."

1923 John Ripley Freeman, "for his eminent service in engineering and manufacturing by his meritorious work in fire prevention and the preservation of property."

1926 R. A. Millikan, "in recognition of his contributions to science and engineering."

1927 Wilfred Lewis, "for his contributions to the design and construction of gear teeth."

1928 Julian Kennedy, "for his services and contributions to the iron and steel industry."

1929 William LeRoy Emmet, "for his contributions in the development of the steam turbine, electric propulsion of ships, and other power-generating apparatus."

Holley Medal

1924 Hjalmar Gotfried Carlson, "for his inventions and processes which made possible the timely production of drawn steel booster casings for artillery ammunition, thereby aiding victory in the World War."

1928 ELMER AMBROSE SPERRY, "for achievements and inventions that have advanced the naval arts, including the gyroscope that has freed navigation from the dangers of the fluctuating magnetic compass."
1929 BARON CHUZABURO SHIBA, "for his contributions to knowledge through fundamental research, including the field of aerodynamics, by the development of ultra-rapid kinematographic methods."

Melville Medal

1927 LEON P. ALFORD, "for his paper on 'Laws of Manufacturing Management.'"
1929 JOSEPH WICKHAM ROE, "for his paper 'Principles of Jig and Fixture Practice,' a thesis of exceptional merit."

Spirit of Saint Louis Medal

1929 DANIEL GUGGENHEIM, founder of the Guggenheim Fund for the Promotion of Aeronautics

Junior Award

1915 ERNEST O. HICKSTEIN, "Flow of Air through Thin Plate Orifices"
1916 L. B. MCMILLAN, "The Heat Insulating Properties of Commercial Steam-Pipe Coverings"
1919 E. D. WHALEN, "Properties of Airplane Fabrics"
1921 S. LOGAN KERR, "Moody Ejector Turbine"
1922 R. H. HEILMAN, "Heat Losses from Bare and Covered Wrought-Iron Pipe at Temperatures up to 800 Degrees Fahrenheit"
F. L. KALLAM, "Preliminary Report on the Investigation of the Thermal Conductivity of Liquids"
1923 S. S. SANFORD and S. CROCKER, "The Elasticity of Pipe Bends"
1924 R. H. HEILMAN, "Heat Losses through Insulating Material"
1925 GILBERT S. SCHALLER, "An Investigation of Seattle as a Location for a Synthetic Foundry Industry"
1927 WM. M. FRAME, "Stresses Occurring in the Walls of an Elliptical Tank Subjected to Low Internal Pressure"
1928 M. D. AISENSTEIN, "A New Method of Separating the Hydraulic Losses in a Centrifugal Pump"
1929 ARTHUR M. WAHL, "Stresses in Heavy Closely Coiled Helical Springs"

Student Award

1916 BOYNTON M. GREEN, Stanford University, "Bearing Lubrication"
HOWARD E. STEVENS, Rensselaer Polytechnic Institute, "An Investigation of the Dynamic Pressure on Submerged Flat Plates"
M. ADAM, Louisiana State University, "The Adaptability of the Internal Combustion Engine to Sugar Factories and Estates"
1917 H. R. HAMMOND and C. W. HOLMBERG, Pennsylvania State College, "Study of Surface Resistance with Glass as the Transmission Medium"
1919 C. F. LEH and F. G. HAMPTON, Stanford University, "An Experimental Investigation of Steel Belting"
W. E. HELMICK, Stanford University, "An Experimental Investigation of Steel Belting"

1920 Howard G. Allen, Cornell University, "Wire Stitching through Paper"
1921 Karl H. White, University of Kansas, "Forces in Rotary Motors"
Richard H. Morris and Albert J. R. Houston, University of California, "A Report upon an Investigation of the Herschel Type of Improved Weir"
1923 Charles F. Olmstead, University of Minnesota, "Oil Burning for Domestic Heating"
H. E. Doolittle, University of California, "The Integrating Gate: a Device for Gaging in Open Channels"
1924 George Stuart Clark, Stanford University, "Two Methods Used for the Determination of the Gasoline Content of Absorption Oils in Absorption Plants"
L. J. Franklin and Charles H. Smith, Stanford University, "The Effect of Inaccuracy of Spacing on the Strength of Gear Teeth"
1925 Harry Pease Cox, Jr., Rensselaer Polytechnic Institute, "A Study of the Effect of End Shape on the Towing Resistance of a Barge Model"
W. S. Montgomery, Jr., and E. Ray Enders, Jr., Pennsylvania State College, "Some Attempts to Measure the Drawing Properties of Metals"
1926 R. E. Peterson, University of Illinois, "An Investigation of Stress Concentration by Means of Plaster of Paris Specimens"
Cecil G. Heard, University of Toronto, "Pressure Distribution over U. S. A. 27 Aerofoil with Square Wing Tips Model Tests"
1927 Alfred H. Marshall, Princeton University, "Evaporative Cooling"
Roger Irwin Eby, University of Washington, "Measurement of the Angular Displacement of Flywheels"
1928 Clarence C. Franck, Johns Hopkins University, "Condition Curves and Re-heat Factors for Steam Turbines"
1929 Frank Vernon Bistrom, University of Washington, "An Investigation of a Rotary Pump"
William Wallace White, University of Washington, "An Investigation of a Rotary Pump"

Charles T. Main Award

1925 Clement R. Brown, Catholic University of America. Subject: "The Influence of the Locomotive on the Unity of the United States"
1926 W. C. Saylor, Johns Hopkins University. Subject: "The Effect of the Cotton Gin upon the History of the United States during Its First Seventy Years"
1927 No award. Subject: "Scientific Management and Its Effect upon the Industries"
1928 Robert M. Meyer, Newark College of Engineering. Subject: "Scientific Management and Its Effect upon Manufacturing"

RESEARCH

Purpose

Research in science and engineering is fast coming to be recognized as one of the most important factors affecting industrial progress. Since the Society's members are closely connected with

and are leaders in industry, it is natural that the A.S.M.E. should take an active part in the initiation and support of research in the mechanical engineering field. It can be particularly helpful in sponsoring investigations that are of general interest to various units of industry and which are of a nature that offer promise of satisfactory completion through cooperative attack. While the Society's limited research budget does not permit of grants for the actual conduct of specific research projects, a stimulating and helpful influence is exerted through committee activity. To enumerate, the following important functions may be exercised: (*a*) to act as a clearing house for the dissemination of research information; (*b*) to coordinate existing research where possible, thus eliminating waste due to the duplication of effort; (*c*) to organize and conduct cooperative research work on problems of both a fundamental and applied nature in engineering and industry; and (*d*) to develop ways and means of assisting in the education and training of research workers for industry.

Development of A.S.M.E. Research Activities

More than twenty years ago the Society added research to the list of its regular activities when a standing committee on research was established by the Council. As time went on its organization and procedure gradually took on definite form, and new possibilities for service were developed. Special committees were then formed to undertake the various studies.

It was not until the end of the World War, however, that a separate budget item for research was established by the A.S.M.E. Council. Since that time approximately $67,000 has been expended by the Research Committee in the development and organization of Special and Joint Research Committees and in other research activities. The success of its methods is attested to by the fact that in that time an additional $207,000 has been raised from industry and other sources by its committees for the support of their work.

Organization, Program, and Procedure

Organization. The research activities of The American Society of Mechanical Engineers are organized and directed by a Standing Committee of the Council, the governing body of the Society, officially known as the A.S.M.E. Research Committee. The personnel of this committee is given on page 55.

The Council makes an annual appropriation for research from the funds of the Society and this money is used by the Research Committee to initiate, organize, and foster special research committees whose problems cover the various fields of mechanical engineering and

allied industries. A list of these special committees is given on pages 64-66. A small staff is maintained to assist in the detailed work of the Research Committee.

Program. The research program of the Committee is made up of projects which are originated by certain individuals or groups, the Research Committee itself, other technical committees of the Society, such as on Standards, Safety, and Power Test Codes, or the recently formed Survey Committees of the A.S.M.E. Professional Divisions. It is the function of these Survey Committees to canvass the needs of their particular field for research problems and to bring them to the attention of the Research Committee in the form of definitely outlined research projects which will advance the art of mechanical engineering and will commend themselves to financial support by industry.

Procedure. Following the authorization of a proposal as an A.S.M.E. research project by the A.S.M.E. Council, the Research Committee organizes a Special Research Committee of interested and qualified individuals selected both from among those industries which have already indicated their interest in the project and from among those individuals whose knowledge and experience particularly fit them to advise on the technical aspects of the committee's activities. Membership and work on these committees are entirely voluntary and are not limited to those who hold membership in the A.S.M.E. Each Special Committee acts as a clearing house of information on its particular subject, maps out an investigational program, carries on a financial campaign throughout the interested industries for support of its projects, and employs and supervises the work of research fellows who are established in university, government, or industrial laboratories.

Cooperation with Other Research Agencies

Oftentimes research can be most effectively undertaken through the joint efforts of several technical societies. Where greater effectiveness seems assured, therefore, this Society joins with other technical organizations in the sponsorship of such a project. Close contact with Engineering Foundation and the National Research Council is maintained through A.S.M.E. membership on the governing boards of these research agencies.

Approved Research Publications of the A.S.M.E.

Bibliography on Riveted Joints
Report on Fluid Meters—Their Theory and Application, Part 1 (Second Edition)
Bibliography on Mechanical Springs
Bibliography on Effect of Temperature on Properties of Metals
Bibliography on Woods of the World—Exclusive of the Temperate Region of North America and with Emphasis on Tropical Woods

STANDARDIZATION

Purpose

The growth of the standardization activities of the Society has been a direct result of the demand for engineering and industrial standards and for the information about them on the part of our membership. This department endeavors to encourage the development of standards in the mechanical engineering field, to assist in this work through the organization and activity of representative committees, and to keep the members of the Society fully informed concerning all standards activity.

Brief Historical Note

The early records of the Society show that five years after it was founded a Standardization Committee on Pipe and Pipe Threads was appointed (1885). This Committee made its report the following year, and from that time standards committees have been almost continuously at work. In 1892 the first report on the standardization of pipe flanges was published. It was revised and republished in 1900 and was again revised and extended during the years 1912-1914 and 1916-1918. As far back as 1901 another committee of the Society developed and printed a complete standard for pipe unions.

In May, 1889, Mr. James W. See, a member of the Society, called attention to the great need for the registration of standards and proposed that steps be taken to have the Government set up a Bureau of Standards[1] to operate similarly to the Patent Department. The Council appointed a committee to investigate the subject. It reported in November, 1891, that a bill to provide for the registration of standards had been presented to the House of Representatives and referred to the Committee on Patents. The bill was never reported out and it was predicted that many years would elapse before satisfactory action by Congress would result.

In the early days before the organization of the American Society for Testing Materials in 1902, the Society had committees at work developing standard tests and methods of testing materials. The first report on this subject was published in 1890.

The standardization of screw threads has received the attention of numerous committees, the first of which reported in 1907 on standard proportions for machine screws. Special threads for electric fixtures and fittings were covered by two reports published

[1] The organization of the National Bureau of Standards was authorized by Congress on March 3, 1901.

in 1915, and three years later (1918) a comprehensive report appeared on the standardization of limits and tolerances in screw-thread fits. Finally this preliminary work had its culmination in the report of the Sectional Committee on the Standardization and Unification of Screw Threads which was published in 1924 under the title Screw Threads for Bolts, Machine Screws, Nuts and Commercially Tapped Holes.

The diversity of the Society's interest in the field of standardization is shown by the fact that the list of standards developed by its early committees includes those for pipe threads, abbreviations, symbols, punctuation, etc., in technical papers (1904); code for identification of power-house piping (1911); catalogue sizes (1913); pipe-thread gages (1913); mechanical filters (1916); and standards for graphic presentation (1917).

With the establishment of the American Engineering Standards Committee (now the American Standards Association), the scope of the Society's activities in Standardization were broadened to include such projects as Shafting Diameters and Keys, Metal Fits, Ball and Roller Bearings, Gears, Screw Threads, Pipe Flanges and Fittings, Bolt, Nut and Rivet Proportions, Small Tools and Machine Tool Elements, Drawings and Drafting-Room Practice, Wire and Sheet Metal Gages, Wrought Iron and Wrought Steel Pipe and Tubing, Electric Motor Frame Dimensions, Speeds of Driven Machines, Screw Threads for Small Hose Couplings, Plumbing Equipment, Rolled Threads for Screw Shells of Electric Sockets and Lamp Bases, and Stock Sizes, Shapes, and Lengths for Hot- and Cold-Finished Iron and Steel Bars.

Approximately two hundred other organizations are assisting in the development of the diversified standards sponsored by the Society.

A.S.M.E. Standards Organization

Realizing the growing importance of this branch of the Society's activity, the Council in 1911 created the Standing Committee on Standardization and placed at its head that pioneer in this field, Henry Hess, who served until his death. It is the duty of this Committee to receive all proposals for the development of standards, to initiate projects, to keep the Council fully informed on standardization matters of interest to A.S.M.E. members in general, and to organize and pass on the work of the Seectional Committees which now function under the procedure of the A.S.A. The personnel of the Standing Committee for 1929 appears on page 55 and a list of sectional and subcommittees on pages 66-71.

Relations with Other A.S.M.E. Activities

Through the pages of *Mechanical Engineering* the Committee on Standardization endeavors to keep the membership fully informed on the developments in its field in the United States and foreign countries. One of the steps in the procedure for approving reports, standards, and codes by the Society calls for their publication in *Mechanical Engineering* in full or abstract. In addition to this publicity, hearings on certain important standards or codes are often called.

Financial Support

The small annual appropriations which are made for standardization serve to cover only the executive work necessary for the carrying through of the various projects for which the Society has accepted sponsorship or joint sponsorship, and to take care of the necessary correspondence and clerical work. Often industrial groups augment these meager funds by subscriptions toward the advancement of specific projects in which they are specially interested.

Notable examples of this are (*a*) the contribution of $2,000 by the bolt, nut, and rivet manufacturers for the support of the activities of the Sectional Committee on the Standardization of Bolt, Nut, and Rivet Proportions, and (*b*) the recent contribution of $1,050 by the milling cutter manufacturers toward the expenses of publication of the new American Standard for Milling Cutters.

Organization and Function of American Standards Association

The American Engineering Standards Committee, organized in 1918, and reorganized in 1928 as the American Standards Association, serves as the national clearing house for engineering and industrial standardization, acts as the official channel of cooperation in international standardization, and provides an information service on engineering and industrial standardization. The ultimate responsibility for and control of the work rests with the forty national organizations whose representatives constitute the Standards Council. The Society is one of these member bodies, having been one of the five founder societies; the names of its representatives on the A.S.A. will be found on page 62.

The A.S.A. approval of a given standard means that a national consensus has been reached. It is, therefore, the agency through which industrial standardization in this country is passing from standardization by associations, societies, and governmental agencies, to standardization on a national scale. Through its method and procedure, which are the result of extensive study and discussion on the part of

the numerous bodies concerned, and which have been further developed through years of experience, the standardization work of the many bodies concerned is being broadened and unified into a system by which national industrial standards are developed and promulgated.

Approved Standards Published by the A.S.M.E.

Cold Finished Shafting, Standard Diameters and Lengths
Square and Flat Stock Keys, Standard Widths and Heights
Plain Taper Stock Keys, Square and Flat
Gib Head Taper Stock Keys, Square and Flat
Code for Design of Transmission Shafting
Tolerances, Allowances, and Gages for Metal Fits
Spur Gear Tooth Form, 14½ Degree Composite System, 20 Degrees Stub Involute System
American Standard Screw Threads for Bolts, Machine Screws, Nuts, and Commercially Tapped Holes
Cast Iron Pipe Flanges and Flanged Fittings; All Sizes for Maximum Working Saturated Steam Pressure of 125 Lb. per Sq. In. (Gage); Sizes 12 Inches and Smaller for Maximum Non-Shock Working Hydraulic Pressure of 175 Lb. per Sq. In. (Gage) at or near the Ordinary Range of Air Temperatures
Cast Iron Screwed Fittings, for Maximum Working Saturated Steam Pressure of 125 and 250 Lb. per Sq. In. (Gage)
Malleable Iron Screwed Fittings, for Maximum Working Saturated Steam Pressure of 150 Lb. per Sq. In. (Gage)
Cast Iron Long Turn Sprinkler Fittings (Screwed and Flanged) for Maximum Hydraulic Working Pressures of 150 and 250 Lb. per Sq. In. (Gage)
Steel Pipe Flanges and Flanged Fittings, for Maximum Working Steam Pressures of 250, 400, 600, 900, and 1350 Lb. per Sq. In. (Gage) at a Temperature of 750 Deg. Fahr.
Small Rivets, 7/16 Inch Nominal Diameter and Under
Tinners', Coopers' and Belt Rivets
Wrench Head Bolts and Nuts and Wrench Openings
Round Unslotted Head Bolts (Carriage, Step and Machine Bolts)
Plow Bolts
Scheme for Identification of Piping Systems
T-Slots, Their Bolts, Nuts, Tongues, and Cutters
Tool Holder Shanks and Tool Post Openings
Symbols for Hydraulics
Aeronautical Symbols
Mathematical Symbols
Fire Hose Coupling Screw Thread for All Connections Having Nominal Inside Diameters of 2½, 3, 3½, and 4½ Inches

POWER TEST CODES

Scope of the Codes

The purpose of the Power Test Codes is to provide standard directions for conducting and reporting performance tests of powerplant and heat apparatus, such as are most commonly undertaken in connection with commercial transactions. They are sufficiently

comprehensive to apply to tests which determine all the details of the performance, but selected parts of these Codes may be used for tests of limited scope. They apply further to tests which concern the fulfilment of performance guarantees, and to acceptance tests.

The Codes are not intended to supply directions for general research nor for the development of equipment or of processes. It is assumed, however, that the engineer who is concerned with research will proceed as nearly as practicable in harmony with their requirements and that in the publication of results he will employ forms of presentation which will be comparable with those of the Codes.

Historical Note

In 1884 an A.S.M.E. committee was appointed to formulate a code entitled a Standard Method for Steam Boiler Trials. This code soon became the standard practice of the profession in this country and the basis upon which performance guarantees were drawn and settled. At that time there were no other recognized rules for practice extant in the United States. This A.S.M.E Code was revised in 1899 and has since undergone several other revisions made necessary by the progress of the art.

Test codes for prime movers soon followed. The Standard Method of Conducting Duty Trials of Steam Pumping Engines was published in 1891, the Code for Locomotive Tests appeared in 1893, and the report on a Standardized System of Testing Steam Engines was published in 1902.

In Great Britain the Institution of Civil Engineers appointed a similar committee on Tabulating the Results of Steam Engine and Boiler Trials in 1897. Its report was made in 1902 and revised in 1913. Nine years later in 1922 a joint committee consisting of representatives of eighteen organizations, including the Institution of Mechanical Engineers, was organized to redraft and expand the report to include all types of heat engines. The report of this committee was issued in 1927.

Revision of Codes

A comprehensive and thorough revision and extension of the A.S.M.E. Test Codes was begun in 1909 and completed and published in 1915. This group of test codes is entitled Rules for Conducting Performance Tests of Power-Plant Apparatus and covers the testing of boilers; reciprocating steam engines; steam turbines; pumping machinery; compressors, blowers, and fans; complete steam-power plants; locomotive gas producers; gas and oil engines; and water-wheels.

In the fall of 1918 the Council, realizing the need for a further revision and extension of these Test Codes, created a Standing Committee of 25 men for this purpose. This Main Committee with its 20 associated Individual Committees, was organized in December of that year with Dr. Fred R. Low as its chairman. (See pages 56 and 71.)

Plan of Committee Organization

The Main Committee formulates the plan and scope of the work, determines what codes should be developed, nominates persons for appointment by the President as members of the committees charged with the development of the individual codes, and suggests changes if necessary to correlate their work with that of the other committees and with the general plan. When a code submitted by an individual committee is complete and satisfactory to American industry, the Main Committee transmits it to the Council with its recommendations, and when approved by the Council the code is published as the A.S.M.E. code on that particular subject over the signatures of the members of the individual committee which formulated it. This code then becomes the standard practice of the Society.

The members of the individual committees have been selected with special reference to their knowledge of the various subjects, as it is the Society's expectation that the codes when issued will embody the best thought and experience of the profession. The choice of members has not been confined to engineers who are members of the Society. Knowledge of the subject is considered more important than society affiliation. As the members of the individual committees are widely distributed geographically a great part of their work is carried on by correspondence.

The A.S.M.E. Committees on Power Test Codes are favored by the cooperation of other societies. For example, the Committee on Refrigerating Systems is identical in its membership with the committee appointed for a similar purpose by the American Society of Refrigerating Engineers. In the development of the Test Code for Evaporating Systems, the Individual Committee cooperated closely with the committee appointed by the American Institute of Chemical Engineers. The American Society for Testing Materials Committee on Coal and Coke has worked in close cooperation with the Individual Committee on Fuels in the preparation of the Test Code for Solid Fuels. During the final stages in the completion of the Test Code for Gas Producers, the American Gas Association Subcommittee on Gas Producer Operation rendered valuable assistance to the A.S.M.E. Committee by reviewing printer's proofs and offering suggestions for changes and additions. The Hydraulic Society and The Compressed Air Society have accepted as the standards of their organizations cer-

tain of the A.S.M.E. Power Test Codes which apply in their particular fields.

The individual committees have chosen their own officers and have perfected their organization. They are free to seek the cooperation of every individual and organization having information upon or interest in their respective codes, especially those whose interests will be affected by these codes. The committees may avail themselves also of the cooperation of other societies or committees interested in their codes. Should they desire to add to their membership or to invite an organization to participate in their work by the appointment of representatives upon their committees, recommendations are made to the Main Committee, which transmits such recommendations to the Council for invitations or appointments.

Approved Test Codes Published by the A.S.M.E.

General Instructions
Definitions and Values
Solid Fuels
Stationary Steam-Generating Units
Reciprocating Steam Engines
Steam Turbines
Reciprocating Steam-Driven Displacement Pumps
Centrifugal and Rotary Pumps
Displacement Compressors and Blowers
Condensing Apparatus
Feedwater Heaters
Refrigerating Systems
Evaporating Apparatus
Steam Locomotives
Gas Producers
Internal-Combustion Engines
Hydraulic Power Plants and Their Equipment
Speed-Responsive Governors
Instruments and Apparatus:
- Part 1, General Considerations
- Part 2. Pressure Measurement; Chapter 1, Barometers and Chapter 6, Tables, Multipliers and Standards for Barometers, Mercury and Water Columns and Pressure Measurements
- Part 21, Leakage Measurement; Chapter 1, Condenser Leakage Tests

Other Codes being revised or developed for the first time are:

Liquid Fuels
Gaseous Fuels
Centrifugal and Turbo-Compressors and Blowers
Complete Steam-Electric Power Plants
Water-Cooling Equipment
Instruments and Apparatus (40 Parts and Chapters)

International Relations on Power Test Codes

The International Electrotechnical Commission held its first meeting in London in 1906 as a direct result of the Electrical Congress of 1904 in St. Louis. It was organized primarily as an international standardizing body in the electrical field, but in July, 1914, it published specifications on the " Nomenclature for Hydraulic Turbines for Electrical Plants."

In 1924 the World Power Conference held in London requested the I.E.C. to take up actively the development of international agreements relative to test codes or specifications for prime movers. Prior to that time committees in Great Britain, Switzerland, Germany, and the United States had developed national codes for water turbines, steam turbines, internal-combustion engines, etc. In February, 1925, the U. S. National Committee of the I.E.C. invited The American Society of Mechanical Engineers to accept membership and later recognized the A.S.M.E. Committee on Power Test Codes as the authoritative group in the United States on the testing of prime movers and other auxiliary apparatus. This invitation was accepted and the A.S.M.E. through its five representatives on the U. S. National Committee has since taken an active part in the conferences.

Following the New York meeting of the International Electrotechnical Commission held in April, 1926 (the A.S.M.E. and the Main Committee on Power Test Codes participating), the U. S. National Committee of the I.E.C. was designated as the Secretariat of I.E.C. Advisory Committee No. 4 on Prime Movers, with Dr. Fred R. Low, Chairman of the A.S.M.E Committee on Power Test Codes, named as Director.

Accordingly, in preparation for a meeting of the Advisory Committee held at Bellagio, Lake Como, Italy, in September, 1927, the Secretariat developed a group of proposals which it believed would assist in unifying and accelerating the work of the Advisory Committee relative to hydraulic and steam turbines. These proposals related to the establishment of a definite outline for international documents on the testing of these prime movers. At this same meeting Advisory Committee No. 4 was divided into two separate committees, namely, Advisory Committee No. 4 on Hydraulic Turbines and Advisory Committee No. 5 on Steam Turbines. The international document on the testing of hydraulic turbines was completed by the Advisory Committee and approved by the Commission at Bellagio.

The beginnings of an international document on the testing of steam turbines was formulated at New York and was further developed at the next meetings of Advisory Committee No. 5 held at Bellagio, Italy, 1927, and at The Hague, Holland, 1928. The British Report of the Institution of Civil Engineers on " Tabulating the Results of Heat

Engine Trials," the suggestion of the German National Committee for a Code for Acceptance Tests on Steam Turbines, and the A.S.M.E. Power Test Codes for Steam Turbines were used as the bases for this set of rules.

A fourth meeting of Advisory Committeé No. 5 on Steam Turbines was held in London, July, 1929, to further discuss the international proposals which the Secretariat had edited and printed following the meeting at The Hague. Dr. William F. Durand presided at this as well as the Bellagio meeting, and he, with Messrs. Francis Hodgkinson and Irving E. Moultrop, represented the U. S. National Committee of the I.E.C. The first part printed of the complete document is known as "Specifications." These specifications are based on a publication of the British National Committee and cover definitions and information to be supplied with inquiry or order, as well as the recommended standard ratings and steam pressures relevant to an international document on steam turbines. The second part consists of "Rules for Acceptance Tests."

During the coming year the Secretariat and a special editing committee will complete the further revision of this material in time for final consideration by Advisory Committee No. 5 prior to and during the Stockholm meeting in 1930. In addition to Parts I and II the I.E.C. Document on Steam Turbines will have an appendix dealing with instruments and methods of measurement. Considerable progress has been made in the development of the paragraphs of this appendix, but its completion and inclusion in the I.E.C. document will probably require a year or two longer.

SAFETY

Purpose

The interest of the members of The American Society of Mechanical Engineers in this subject springs from at least four sources: (*a*) close association with the rapid development of manually operated and automatic machinery; (*b*) growing appreciation of the importance of the science of management to industry and the direct bearing of safety to health, life, and limb on successful operation in industrial plants; (*c*) the realization of the superiority of built-in guards and the dependence of their general adoption on the national safety-code movement; and (*d*) economic considerations which affect in a general way the life and happiness of the various communities of the country. The Society is one of the pioneer organizations at work in this field, feeling a special sense of obligation to have regard for the welfare of human life as an essential part of its engineering achievement.

Brief Historical Note

In the early part of the last decade several states began to include in their laws provisions for the protection and care of industrial workers. Since many of these sets of rules or codes involved knowledge of engineering principles and data, A.S.M.E. members were from time to time urged to assist in their development. This situation led naturally to the formation of certain highly technical safety codes by special committees of the Society. The first of these was published in 1915 and is known as a Safety Code for the Use and Care of Abrasive Wheels. The next year (1916) two codes were completed, namely, Code of Safety Standards for Cranes and Code of Safety Standards for Power-Transmission Machinery. In 1917 appeared a Code of Safety Standards for Ladders and a Code of Safety Standards for Woodworking Machinery.

At the 1915 Annual Meeting, Carl M. Hansen, in a paper on "Standardization of Safety Principles," pointed out that it is through the standardization of safety codes that engineers can play a most important rôle. In his opinion the important characteristics of safety codes are: (*a*) high standards, (*b*) comprehensive scope, (*c*) practical provisions, (*d*) simple rules, and (*e*) positive requirements.

Organization and Procedure

In the spring of 1915 the Committee on Meetings appointed a subcommittee on Protection of Industrial Workers. The members of this committee were John H. Barr, Chairman, Melville W. Mix, John Price Jackson, William A. Viall, and John W. Upp. The purpose of this subcommittee was stated as follows: "To take a part in bringing about the standardization of effective and practical protective devices and methods." The Committee on Protection of Industrial Workers was soon made a Special Committee of the Society and later, in October, 1921, following the publication of the Safety Code for Elevators, one of its most important contributions to engineering and industrial safety, it was discharged.

By this time (1921) the promotion of safety had become a major activity of the Society, so it is now supervised by a Standing Committee which consists of five members, one appointed each year for five years. The personnel of this Committee is given on page 56.

Connection with A.S.A.

With the organization and satisfactory functioning of the A.E.S.C. (now the A.S.A.), the A.S.M.E agreed to carry on all of its safety-code work under the procedure of the A.S.A., on which body the Society has three representatives. It accordingly now holds joint

sponsorship for the sectional committees which are formulating the following safety codes:

Safety Code for Elevators
Safety Code for Mechanical Power-Transmission Apparatus
Safety Code on Machinery for Compressing Air
Safety Code for Conveyors and Conveying Machinery
Safety Code for Cranes, Derricks and Hoists

At the request of the sponsors for other safety codes the Society is represented on twenty-three additional sectional and other safety committees, which are listed on pages 71-72.

Approved Safety Codes Published by the A.S.M.E.

A Safety Code for Elevators, Dumbwaiters, and Escalators
Safety Code for Mechanical Power-Transmission Apparatus

BOILER CODE

Purpose

To formulate standard specifications for the construction of steam boilers and other pressure vessels and for their care in service.

Brief Historical Note

The Boiler Code Committee was appointed by Col. E. D. Meier in 1911 while he was President of the Society. The first edition of the Code, covering power and heating boilers and material specifications, was issued in 1914. The Code was revised in 1918, 1924, and 1927. The A.S.M.E. Boiler Construction Code now consists of eight sections, covering Power Boilers, Material Specifications, Locomotive Boilers, Heating Boilers, Miniature Boilers, Rules for Inspection, Rules for Care of Power Boilers, and Unfired Pressure Vessels.

Committee Organization and Procedure

The Main Boiler Code Committee consists of four representatives of steam-boiler owners and users, one of boiler-insurance companies, one of the railways, one consulting engineer, one representative of industry, three of boiler manufacturers, three of technical schools, one of the technical press, two representatives of steel manufacturers, two of heating-boiler manufacturers, one of the state-inspection authority, one of pressure vessel manufacturers, and two members at large. The personnel of the 1929 Committee is given on page 56.

The Conference Committee consists of thirty-five members who are representatives of the states and cities in which the Boiler Code is operative.

The Main Committee is supplemented by nine subcommittees organized to consider the various phases of boiler-construction problems. (See page 72.)

The Committee meets monthly for the purpose of answering inquiries and formulating interpretations on the Boiler Code. Its procedure in handling the cases is as follows: All inquiries must be in written form before they are accepted for consideration. Copies are sent by the Secretary of the Committee to all of its members. The interpretation, in the form of a reply, is then prepared by the Committee and passed upon at a regular meeting of the Committee. This interpretation is later submitted to the Council of the Society for approval, after which it is issued to the inquirer and simultaneously published in *Mechanical Engineering*.

National and International Relations

Through cooperation of other organizations, the A.S.M.E. Boiler Construction Code has been adopted in 19 states and 16 cities. In addition, the Committee has cooperated directly with various government departments having authority over steam-boiler construction. It has also cooperated with, and furnished information to boiler-inspection departments and authorities in many foreign countries. Effort is made through cooperation with the Industrial Machinery Division of the Department of Commerce to keep on file complete records of all foreign codes and regulations.

Approved Sections of Boiler Construction Code Published by the A.S.M.E.

Section I, Rules for the Construction of Power Boilers
Section II, Rules for Materials Specifications
Section III, Rules for the Construction of Boilers of Locomotives
Section IV, Rules for the Construction of Low-Pressure Heating Boilers
Section V, Rules for the Construction of Miniature Boilers
Section VI, Rules for Inspection
Section VII, Suggested Rules for the Care of Power Boilers and Other Pressure Vessels in Service
Section VIII, Rules for the Construction of Unfired Pressure Vessels

JOINT ACTIVITIES

(For A.S.M.E. representatives on these and other activities, see pages 62-64.)

American Engineering Council

The Federated American Engineering Societies was organized in December, 1920, and its name changed to American Engineering Council in March, 1924. Its object is "to further the public welfare

wherever technical and engineering knowledge and experience are involved, and to consider and act upon matters of common concern to the engineering and allied technical professions."

American Engineering Council coordinates the activities of member national societies, state councils, and local and regional affiliations on national matters and affairs that are of general interest.

The A.S.M.E. has one delegate on the American Engineering Council for every one thousand members. Delegates are elected annually by the membership. The President of the Society is the Chairman of the delegation.

American Standards Association

The American Engineering Standards Committee, reorganized late in 1928 as the American Standards Association, is briefly described on pages 35-36. Complete information may be secured from its Secretary, Dr. P. G. Agnew, 29 West 39th Street, New York, N. Y.

Engineering Education

The Society cooperates with educational organizations such as the Society for the Promotion of Engineering Education, on whose Board of Investigation and Coordination it has two representatives.

Matters pertaining to the education of personnel for the industries through agencies other than colleges and engineering schools are in charge of the Society's Committee on Education and Training for the Industries, the personnel of which is given on page 55.

Engineering Foundation, Inc.

At the close of the year 1929 the United Engineering Society, incorporated on May 11, 1904, by special act of the New York legislature, changed its name to Engineering Foundation, Inc. As the joint administrative and research body for the four Founder Societies — American Society of Civil Engineers, American Institute of Mining and Metallurgical Engineers, The American Society of Mechanical Engineers and American Institute of Electrical Engineers — the Engineering Foundation, Inc., has charge of property, funds, and research work of common interest to them.

The Board of Trustees of Engineering Foundation, Inc., is composed of twelve members, one appointed each year by each Founder Society for a term of three years and eligible for reelection for one term. Under the act of incorporation the Trustees are the members of the corporation.

ENGINEERING SOCIETIES BUILDING

The Engineering Societies Building, located at 29 West 39th Street, New York, N. Y., headquarters for the Founder Societies, was made possible by a gift of $1,050,000 from Andrew Carnegie and contributions from the Founder Societies and friends. It was dedicated in April, 1907, and enlarged by the addition of three stories in 1917. Its operation is directed by the Board of Trustees.

ENGINEERING SOCIETIES LIBRARY

In 1913 the separate libraries of the Founder Societies were consolidated into the Engineering Societies Library. It is administered under the general supervision of the Board of Trustees by the Engineering Societies Library Board, composed of four representatives from each Founder Society, the secretaries of the Founder Societies, and the Director of the Library, Harrison W. Craver.

A Library Endowment Fund was begun in 1916 by a gift of $100,000 from Dr. James Douglas, a member of the A.I.M.E.

The Library is open from 9 a. m. to 10 p. m. daily (summer months to 5 p. m.) except Sundays and legal holidays. The Library Service Bureau furnishes technical references, bibliographies, abstracts, copies, translations, etc., at cost. The photostat service supplies prints at the price of twenty-five cents per sheet. Books in the library's collection of duplicate copies, which includes both old and recent books, may be rented by members of the Founder Societies in any part of the United States at a charge of five cents per day.

ENGINEERING SOCIETIES RESEARCH BOARD

In 1914 the Founder Societies, on the basis of suggestions and a gift of funds by Ambrose Swasey, past-president and honorary member of the A.S.M.E., established the Engineering Foundation as a department of the United Engineering Society. It is now known as the Engineering Societies Research Board. The Research Board is composed of sixteen members, three from each Founder Society, three members-at-large chosen by the Board of Trustees, and the President of Engineering Foundation, Inc., ex-officio.

ADMINISTRATION OF FUNDS

The principals of the Engineering Foundation Fund, the Library Endowment Fund, and all other funds for the Library, for research, for the Engineering Societies Building, and for other purposes, are managed by the Board of Trustees. This Board allocates the incomes to the Library Board, the Research Board, and other boards or com-

mittees of the Foundation in accordance with the purposes for which the several "funds" were established. The Library Board and the Research Board may also receive and use special contributions for any purposes within the broad scope of their activities.

A.S.M.E. REPRESENTATIVES

The representatives of the A.S.M.E. for 1929 on the Engineering Foundation Board and on the United Engineering Society, will be found on page 63. The personnel of the A.S.M.E. Library Committee, who represent the Society on the Engineering Societies Library Board, is listed on page 55.

Engineering Societies Employment Service

ORGANIZATION

The Four National Engineering Societies — A.S.C.E., A.I.M.E., A.S.M.E., and A.I.E.E. — conduct jointly the Engineering Societies Employment Service.

The Secretaries of these Societies act as the Board of Managers, and the work in each office is in charge of a Business Manager.

There are at present offices in Chicago, New York, and San Francisco. Members should conduct their business with the nearest office.

BULLETIN SERVICE

Registration of engineers available for positions is restricted to the membership of the participating organizations.

The Service issues a Bulletin each week which contains lists of positions open and is distributed to members of the four societies under first-class postage at a subscription rate of $3.00 per quarter or $10.00 per annum, payable in advance.

In addition to the Employment Bulletin there appear regularly in the publications of the respective societies lists of men and positions available. This is done without charge.

NATIONAL SERVICE

The policy of the Employment Service will be to open additional offices at strategic points as rapidly as finances will permit, and the local groups of members are willing to undertake responsibility for their management. The Chicago Office is conducted jointly with the Western Society of Engineers, and the San Francisco Office jointly with the Engineers' Club of San Francisco and the California Section of the American Chemical Society.

CONTRIBUTION FOR SERVICE

In order to make the Service self-supporting, members securing positions are invited to contribute to the expenses of maintaining the Service on the basis of one and one half per cent of the annual salary contracted for; or three per cent of the amount received for temporary positions.

CORRESPONDENCE

Correspondence should be addressed to the office nearest to you as follows — *and not to the Society.*

Chicago Office — Engineering Societies Employment Service, 1216 Engineering Bldg., 205 West Wacker Drive, A. Krauser, Manager.

Eastern Office — Engineering Societies Employment Service, 31 West 39th Street, New York, N. Y., Walter V. Brown, Manager.

San Francisco Office — Engineering Societies Employment Service, 57 Post Street, N. D. Cook, Manager.

Forms for registration will be supplied either to employers or members of the societies upon request.

JOHN FRITZ MEDAL BOARD OF AWARD

The John Fritz Medal was established in August, 1902, by the professional associates and friends of the late John Fritz, Past-President and Honorary Member of the A.S.M.E., to perpetuate the memory of his achievement in industrial progress.

The medal is awarded not more than once each year for notable scientific or industrial achievement, with no restrictions on account of sex or nationality. The award is made by a Board of sixteen, four representatives from each of the four national engineering societies.

The recipients of the John Fritz Medal are given in the following list; there were no awards for the years not listed.

1902 JOHN FRITZ, for scientific and industrial achievement

1905 LORD KELVIN, for work in cable telegraphy and other general scientific achievements

1906 GEORGE WESTINGHOUSE, for the invention and development of the air-brake

1907 ALEXANDER GRAHAM BELL, for the invention and introduction of the telephone

1908 THOMAS ALVA EDISON, for the invention of the duplex and quadruplex telegraph; the phonograph; the development of a commercially practical incandescent lamp; the development of a complex system of electric lighting, including dynamos, regulating devices, underground system, protective devices, and meters

1909 CHARLES TALBOT PORTER, for his work in advancing the knowledge of steam engineering and improvements in engine construction

1910 ALFRED NOBLE, for notable achievements as a civil engineer

1911 SIR WILLIAM HENRY WHITE, for notable achievements in naval architecture

1912 ROBERT WOOLSON HUNT, for his contributions to the early development of the Bessemer process

1914 JOHN EDSON SWEET, for his achievements in machine design; and for his pioneer work in applying sound engineering principles to the construction and development of the high-speed steam engine
1915 JAMES DOUGLAS, for notable achievements in mining, metallurgy, education, and industrial welfare
1916 ELIHU THOMSON, for achievements in electrical invention, in electrical engineering and industrial development, and in scientific research
1917 HENRY MARION HOWE, for his investigations in metallurgy, especially in the metallography of iron and steel
1918 J. WALDO SMITH, for achievement as an engineer in providing the City of New York with a supply of water
1919 GEORGE W. GOETHALS, for achievement as builder of the Panama Canal
1920 ORVILLE WRIGHT, for achievement in the development of the airplane
1921 SIR ROBERT A. HADFIELD, for the invention of manganese steel
1922 CHARLES PROSPER EUGENE SCHNEIDER, for achievement in metallurgy of iron and steel, for development of modern ordnance, and for notable patriotic contribution to the winning of the World War
1923 SENATOR GUGLIELMO MARCONI, for the invention of wireless telegraphy
1924 AMBROSE SWASEY, for achievement as a designer and manufacturer of instruments and machines of precision, a builder of great telescopes, a benefactor of education, the founder of the Engineering Foundation
1925 JOHN FRANK STEVENS, for great achievements as a civil engineer, particularly in planning and organizing for the construction of the Panama Canal; as a builder of railroads, and as administrator of the Chinese Eastern and Siberian Railways
1926 EDWARD DEAN ADAMS, for great achievements as engineer, financier, scientist, whose vision, courage and industry made possible the birth at Niagara Falls of hydroelectric power
1927 ELMER AMBROSE SPERRY, for the development of the gyro-compass and application of the gyroscope to the stabilization of ships and aeroplanes
1928 JOHN J. CARTY, for pioneer achievement in telephone engineering and in development of scientific research in the telephone art
1929 HERBERT HOOVER, engineer, scholar, organizer of relief to war-stricken peoples, public servant.

JOINT CONFERENCE COMMITTEE

The Presidents and Secretaries of the A.S.C.E., A.I.M.E., A.S.M.E., and A.I.E.E. constitute the Joint Conference Committee. This committee was authorized in January, 1924, by the boards of direction of the four national engineering societies to formulate a permanent workable method of cooperation on public affairs and other matters of common interest, and assisting in cementing the friendship between American and foreign engineers, and to report its recommendations to the several boards.

WASHINGTON AWARD COMMISSION

The Washington Award was founded in 1916 by John Watson Alvord, to be awarded annually by the Western Society of Engineers

upon the recommendation of a Commission composed of nine representatives of that society and two representatives of each of the four national engineering societies, the A.S.C.E., A.I.M.E., A.S.M.E., and A.I.E.E. It is bestowed in recognition of devoted, unselfish, and pre-eminent service in advancing human progress through engineering. The recipients have been as follows:

1919 Herbert C. Hoover, for his preeminent services in behalf of the public welfare
1922 Robert W. Hunt, for his pioneer work in the development of the steel industry, and for a life devoted to the advancement of the engineering profession
1923 Arthur N. Talbot, for his life work as a student and teacher, investigator and writer, and for his enduring contribution to the science of engineering
1925 Jonas Waldo Smith, for the rare combination of vision, technical skill, and administrative ability and courageous leadership in engineering
1926 John Watson Alvord, for his pioneer work in developing the fundamental principles of public utility valuation and his marked contributions to sanitary science
1927 Orville Wright, for fundamental scientific research and the resultant successful airplane flight
1928 Michael I. Pupin, for devotion to scientific research leading to his inventions which have materially aided the development of long-distance telephony and radio broadcasting
1929 Bion Joseph Arnold, for pioneering work in the engineering and economics of electrical transportation

CODE OF ETHICS

In 1912, the Society appointed its first Committee on Ethics. This committee produced a code which was adopted by letter-ballot of the Society in 1914. It will be found under Article B15 of the By-Laws, elsewhere in this volume.

Professional Conduct Committee

To administer the code, the Council appointed a Standing Committee on Professional Conduct, the personnel of which appears on page 56.

The full procedure for handling cases is given in the Rules of the Society (R15, Rules 1 and 2), found elsewhere in this volume.

EXCHANGE OF COURTESIES

A Card of Introduction is issued annually to members of the A.S.M.E. in good standing. Besides serving as a means of general introduction, this also gives entrée to a number of engineering societies and clubs in this country and abroad, with whom an exchange of privileges has been arranged. In the case of an engineering club *these*

privileges do not include club facilities, sleeping rooms, or restaurant. In no instance do they entitle members to borrow books from libraries, and they are not intended to give residents of cities the privileges of the local engineering organizations. The spirit of the exchange is rather in the nature of special courtesies extended to engineers visiting from other communities, such as the receipt of mail, privileges of the writing and reading rooms, and general information regarding local engineers and industrial plants.

The societies with which the A.S.M.E. has exchange privileges are:

Baltimore, Md., Engineers' Club
Boston, Mass., Boston Society of Civil Engineers
Chicago, Ill., Western Society of Engineers
Cleveland, Ohio, Cleveland Engineering Society
Copenhagen, Danish Society of Civil Engineers
Dayton, Ohio, Engineers' Club of Dayton
Detroit, Mich., Detroit Engineering Society
Havana, Cuba, Cuban Society of Engineers
Gainesville, Fla., Florida Engineering Society
Kansas City, Mo., Engineers' Club of Kansas City
London, Eng., Institution of Civil Engineers
London, Eng., Institution of Mechanical Engineers
London, Eng., Iron and Steel Institute
London, Eng., Junior Institution of Engineers
Los Angeles, Calif., Engineering and Architects Association
Montreal, Canada, Engineering Institute of Canada
Nashville, Tenn., Engineering Association of Nashville
New Orleans, La., Louisiana Engineering Society
New York, American Gas Association
New York, American Institute of Electrical Engineers
New York, American Institute of Mining and Metallurgical Engineers
New York, American Society of Civil Engineers
New York, American Society of Refrigerating Engineers
New York, American Society of Safety Engineers
New York, Chemists Club Library
New York, Columbia University Library
New York, New York Railroad Club
Oslo, Norway, Den Norske Ingeniorforening
Philadelphia, Pa., Engineers' Club of Philadelphia
Pittsburgh, Pa., Engineers' Society of Western Pennsylvania
Prague, Czechoslovakia, Society of Engineers and Architects
Providence, R. I., Providence Engineering Society
Rochester, N. Y., Rochester Engineering Society
St. Louis, Mo., Engineers' Club of St. Louis
Scranton, Pa., Engineers' Society of N. E. Pennsylvania
Scranton, Pa., Scranton Engineers' Club
Seattle, Wash., Pacific Northwest Society of Engineers
Spokane, Wash., Associated Engineers of Spokane
Syracuse, N. Y., Technology Club of Syracuse
Utica, N. Y., Mohawk Valley Engineers' Club
Washington, D. C., Society of American Military Engineers

THE WOMAN'S AUXILIARY TO THE A.S.M.E.

The Woman's Auxiliary to the A.S.M.E. was originally organized to further promote the pleasant relationships developed at Annual Meetings.

It has developed, however, into an organization with many varied activities, thus attracting the membership and interest of all.

An Education Fund has been created from which loans have been made to engineering students.

Another activity has been the collection and distribution of technical literature to engineering colleges and societies.

Regular meetings are held on the second Thursday of each month from October to May, inclusive, in the Engineering Societies Building. Dues are $2.00 per year and the initiation fee is $1.00.

All women in the families of members of the A.S.M.E. are most cordially invited to join the Auxiliary and participate in its functions.

GENERAL INFORMATION—PART 2

OFFICERS AND COUNCIL

President

ELMER A. SPERRY

Past-Presidents

FRED R. LOW
W. F. DURAND
W. L. ABBOTT
CHARLES M. SCHWAB
ALEX DOW

Vice-Presidents

Terms expire December, 1929
JOHN H. LAWRENCE
E. A. MULLER
NEWELL SANDERS
PAUL WRIGHT

Terms expire December, 1930
ROBERT L. DAUGHERTY
WILLIAM ELMER
CHARLES E. GORTON

Managers

Terms expire December, 1929
PAUL DOTY
RALPH E. FLANDERS
CONRAD N. LAUER

Terms expire December, 1930
FREDERICK H. DORNER
WILLIAM A. HANLEY
L. B. MCMILLAN [1]

Terms expire December, 1931
CHARLES M. ALLEN
ROBERT M. GATES
ELY C. HUTCHINSON

Treasurer

ERIK OBERG

Secretary

CALVIN W. RICE

Assistant Secretaries

C. E. DAVIES
E. HARTFORD
C. B. LEPAGE

Executive Committee of Council

ELMER A. SPERRY, *Chairman*
FRED R. LOW, *Vice-Chairman*
ALEX DOW
CHARLES M. SCHWAB
JOHN H. LAWRENCE
CONRAD N. LAUER
L. B. MCMILLAN [1]
CALVIN W. RICE, *Secretary*

[1] Deceased August 10, 1929; Harvey N. Davis appointed to fill vacancy as manager, and Robert M. Gates on executive committee of Council.

Chairmen of Standing Committees

Representatives on Council but without vote

Finance, H. V. Coes
J. L. Walsh, *Vice-Chairman*
Meetings and Program,
S. W. Dudley
Publications, E. D. Dreyfus
Membership, S. D. Collett
Professional Divisions,
Archibald Black
Local Sections, Paul Doty
Constitution and By-Laws,
W. D. Ennis
Awards, Ira N. Hollis
A. M. Greene, Jr., *Vice-Chairman*
Relations with Colleges,
A. A. Potter
Education and Training for Industries, J. T. Faig
Library, O. E. Hovey
Standardization, Collins P. Bliss
Research, A. E. White
Power Test Codes, Fred R. Low
Safety, G. E. Sanford
Professional Conduct,
I. E. Moultrop

STANDING COMMITTEES

NOTE.—*Dates in parentheses denote expiration of terms.*

Finance

H. V. Coes, *Chairman and Representative on Council* (1929)
J. L. Walsh, *Vice-Chairman* (1931)
F. A. Schaff (1930)
David Lofts (1932)
Kingsley L. Martin (1933)
Council Representatives: John H. Lawrence (1929)
L. B. McMillan (1930) [1]

Meetings and Program

S. W. Dudley, *Chairman and Representative on Council* (1929)
W. L. Batt (1930)
G. M. Eaton (1931)
F. M. Feiker (1932)
J. W. Parker (1933)

Publications

E. D. Dreyfus, *Chairman and Representative on Council* (1929)
W. A. Shoudy, *Vice-Chairman* (1930)
F. V. Larkin (1931)
W. H. Winterrowd (1932)
L. C. Morrow (1933)

(*Personnel of Biography Advisory Committee, p. 58*)

Membership

S. D. Collett, *Chairman and Representative on Council* (1929)
L. K. Comstock (1930)
F. A. Waldron (1931)
H. W. Butler (1932)
Hosea Webster (1933)

Professional Divisions

Archibald Black, *Chairman and Representative on Council* (1929)
J. W. Roe (1930)
H. W. Brooks (1931)
W. F. Dixon (1932)
P. T. Sowden (1933)

(*Chairmen of Professional Divisions' Executive Committees, p. 58*)

[1] Deceased August 10, 1929; Robert M. Gates appointed to fill vacancy.

Local Sections

PAUL DOTY, *Chairman and Representative on Council* (1929)
THOS. L. WILKINSON (1930) — CHARLES W. BENNETT (1932)
HARRY R. WESTCOTT (1931) — JAS. M. TODD (1933)

(*Chairmen of Local Sections' Executive Committees, pp. 59-60*)

Constitution and By-Laws

W. D. ENNIS, *Chairman and Representative on Council* (1929)
GEO. E. PFISTERER (1930) — THOS. C. MCBRIDE (1932)
A. D. BLAKE (1931) — R. S. NEAL (1933)

Awards

IRA N. HOLLIS, *Chairman and Representative on Council* (1930)
A. M. GREENE, JR., *Vice-Chairman* (1929) — ROY V. WRIGHT (1932)
H. L. SEWARD (1931) — K. H. CONDIT (1933)

Relations with Colleges

A. A. POTTER, *Chairman and Representative on Council* (1929)
S. H. LIBBY (1930) — D. B. PRENTICE (1932)
M. C. MAXWELL (1931) — E. F. CHURCH, JR. (1933)

(*Honorary Chairmen of Student Branches, pp. 60-62*)

Education and Training for the Industries

JOHN T. FAIG, *Chairman and Representative on Council* (1932)
S. S. EDMANDS (1929) — D. C. JACKSON (1931)
W. S. CONANT (1930) — H. S. FALK (1933)

Library

O. E. HOVEY, *Chairman and Representative on Council* (1929)
H. A. LARDNER (1930) — R. J. S. PIGOTT (1932)
ALTEN S. MILLER (1931) — THE SECRETARY, CALVIN W. RICE

Research

A. E. WHITE, *Chairman and Representative on Council* (1929)
ROBT. L. STREETER (1930) — W. H. FULWEILER (1932)
W. REUBEN WEBSTER (1931) — ALEX. D. BAILEY (1933)

(*Complete list of Research Committees, pp. 64-66*)

Standardization

C. P. BLISS, *Chairman and Representative on Council* (1929)
E. J. KEARNEY (1930) — L. K. SILLCOX (1932)
H. B. TAYLOR (1931) — W. S. MONROE (1933)

(*Complete list of Standardization Committees, pp. 66-71*)

Power Test Codes

FRED R. LOW, *Chairman and Representative on Council* (1930)

Term expires 1929

C. H. BERRY
F. HODGKINSON
D. S. JACOBUS
L. F. MOODY
E. B. RICKETTS

Term expires 1930

F. R. LOW
L. P. BRECKENRIDGE
R. H. FERNALD
C. F. HIRSHFELD
R. J. S. PIGOTT

Term expires 1931

A. G. CHRISTIE
P. DISERENS
C. E. LUCKE
G. A. ORROK
W. M. WHITE

Term expires 1932

H. COOKE
E. R. FISH
O. P. HOOD
H. B. OATLEY
W. J. WOHLENBERG

Term expires 1933

E. H. BROWN
G. A. GOODENOUGH [1]
L. S. MARKS
E. N. TRUMP
G. A. HORNE

(*Complete list of Power Test Code Committees, p. 71*)

Safety

G. E. SANFORD, *Chairman and Representative on Council* (1929)

J. P. JACKSON (1930)
L. R. PALMER (1931)
A. M. TODE (1932)
H. W. MOWERY (1933)

(*Complete list of Safety Committees, pp. 71-72*)

Professional Conduct

I. E. MOULTROP, *Chairman and Representative on Council* (1929)

JAS. E. SAGUE (1930)
DWIGHT P. ROBINSON (1931)
WILLIAM B. POWELL (1932)
A. G. CHRISTIE (1933)

SPECIAL COMMITTEES

Boiler Code

FRED R. LOW, *Chairman*
JOHN A. STEVENS, *Honorary Chairman* [2]
D. S. JACOBUS, *Vice-Chairman*
C. W. OBERT, *Honorary Secretary*
M. JURIST, *Acting Secretary*
H. E. ALDRICH
WM. H. BOEHM
FRANK S. CLARK
FRANCIS W. DEAN
W. F. DURAND
THOMAS E. DURBAN
EDWARDS R. FISH
VINCENT M. FROST
CHARLES E. GORTON
ARTHUR M. GREENE, JR.
FRANK B. HOWELL
CHAS. L. HUSTON
S. F. JETER [3]
J. O. LEECH
EDWARD F. MILLER
M. F. MOORE
I. E. MOULTROP
C. O. MYERS
JAMES PARTINGTON
C. L. WARWICK
H. LEROY WHITNEY

Honorary Members

THOMAS E. DURBAN
H. H. VAUGHAN
WILLIAM F. KIESEL, JR.

(*Complete list of Boiler Code Committees, p. 72*)

[1] Deceased, September 29, 1929; Irving E. Moultrop appointed to fill vacancy. [2] Deceased, November 18, 1929. [3] Deceased, December 31, 1929.

Regular Nominating Committee

GROUP	REPRESENTATIVE	ALTERNATE
I	James A. Hall, *Chairman* Providence	Carleton A. Read Worcester
II	Vincent M. Frost, *Secretary* Newark	W. W. Macon New York
III	N. E. Funk Philadelphia	Mortimer F. Sayre Schenectady Donald B. Prentice Easton
IV	Wm. B. Tuttle San Antonio	Eugene W. O'Brien Atlanta
V	John A. Hunter Boulder	Albert E. White Ann Arbor
VI	Dean E. Foster Tulsa	Max Toltz St. Paul
VII	Leonard Cahoon Salt Lake City	Walter H. Trask, Jr. Salt Lake City

Local Sections in Nominating Committee Groups

GROUP I

Boston
Bridgeport
Green Mountain
Hartford
Meriden
New Britain
New Haven
Providence
Waterbury
Western Mass.
Worcester

GROUP II

Metropolitan (N. Y.) and Foreign Members

GROUP III

Anthracite-Lehigh Valley
Baltimore
Central Pa.
Ontario
Philadelphia
Plainfield
Rochester
Schenectady
Susquehanna
Syracuse
Utica
Washington, D.C.

GROUP IV

Atlanta
Birmingham
Charlotte
Chattanooga
Florida
Greenville
Houston
Knoxville
Memphis
New Orleans
North Texas
Raleigh
Savannah
Virginia

GROUP V

Akron
Buffalo
Cincinnati
Cleveland
Columbus
Dayton
Detroit
Erie
Indianapolis
Louisville
Peninsula
Pittsburgh
Toledo
West Virginia
Youngstown

GROUP VI

Chicago
Kansas City
Mid-Continent
Milwaukee
Minneapolis
Nebraska
Rock River Valley
St. Joseph Valley
St. Louis
St. Paul
Tri-Cities

GROUP VII

Colorado
Inland Empire
Los Angeles
Oregon
San Francisco
Utah
Western Washington

Tellers of Election

THOMAS H. NORMILE — HARRY S. DURLAND
GEORGE A. ROBE

Biography Advisory Committee

FRED R. LOW, *Chairman* — GEO. A. ORROK
ROY V. WRIGHT, *Vice-Chairman* — JOHN R. FREEMAN
RALPH E. FLANDERS

Economic Status of the Engineer

CONRAD N. LAUER, *Chairman* — H. B. OATLEY
C. F. HIRSCHFELD — W. A. STARRETT
DEXTER S. KIMBALL — H. L. WITTEMORE

Society's Revenues

W. L. BATT, *Chairman* — CONRAD LAUER
DEXTER S. KIMBALL — ERIK OBERG
R. E. FLANDERS — J. D. CUNNINGHAM
J. L. WALSH

Meetings and Budget, Conference Committee

H. V. COES, *Chairman*, Finance Committee

With Representatives of Meetings and Program, Local Sections, and Professional Divisions Committees

PROFESSIONAL DIVISIONS

(For complete personnel of executive and sub-committees consult 1929 Membership List)

Division	Executive Committee Chairmen
Aeronautic	EDWIN E. ALDRIN
Applied Mechanics	G. M. EATON
Fuels	VICTOR J. AZBE
Hydraulic	L. F. MOODY
Iron and Steel	C. SNELLING ROBINSON
Machine-Shop Practice	W. J. PEETS
Management	W. L. CONRAD
Materials Handling	G. E. HAGEMANN
National Defense	JAMES L. WALSH
Oil and Gas Power	E. J. KATES
Petroleum	W. G. HELTZEL
Power	F. M. GIBSON
Printing Industries	EDWARD PIERCE HULSE
Railroad	R. S. MCCONNELL
Textile	EDWIN H. MARBLE
Wood Industries	WM. BRAID WHITE

LOCAL SECTIONS

(For complete personnel for 1928-1929 and further information consult 1929 Membership List; personnel for 1929-1930 in 1930 Membership List)

Section	Executive Committee Chairmen
Akron	C. M. Wilkinson
Anthracite-Lehigh Valley	Harry Ferguson
Atlanta	E. W. O'Brien
Baltimore	F. A. Allner
Birmingham	C. B. Davis
Boston	C. H. Chase
Bridgeport	H. N. Downs
Buffalo	S. S. Lowe
Central Pennsylvania	C. W. Beese
Charlotte	E. E. Williams
Chattanooga	Newell Sanders
Chicago	R. H. Bacon
Cincinnati	O. E. Hilmer
Cleveland	Warner Seely
Colorado	B. E. Sibley
Columbus	H. M. Bush
Dayton	S. J. Hopper
Detroit	C. J. Oxford
Erie	E. S. Rush
Florida	H. F. Greene, Jr.
Green Mountain	G. A. Perry
Greenville	Earle R. Stall
Hartford	R. F. Dow
Houston	C. R. Weeks
Indianapolis	W. M. Taylor
Inland Empire	H. J. MacCamy
Kansas City	W. E. New
Knoxville	W. R. Woolrich
Los Angeles	L. M. Griffith
Louisville	B. M. Brigman
Memphis	T. H. Allen
Meriden	C. F. Schnepp
Metropolitan	R. J. S. Pigott
Mid-Continent	W. G. Heltzel
Milwaukee	C. A. Cahill, Sr.
Minneapolis	C. A. Herrick
Nebraska	L. J. Ruf
New Britain	Albert Vuilleumier
New Haven	W. W. Gaylord
New Orleans	J. M. Todd
North Texas	C. A. Cowles, Jr.
Ontario	E. A. Allcut
Oregon	F. L Davis
Peninsula	B. A. Parks
Philadelphia	J. H. Billings
Pittsburgh	Kenneth Seaver
Plainfield	A. A. Ackerman
Providence	H. B. Lewis
Raleigh	J. M. Foster

Section	Executive Committee Chairmen
Rochester	F. H. Evans
Rock River Valley	A. M. Johnson
St. Joseph Valley	C. C. Wilcox
St. Louis	F. A. Berger
St. Paul	W. A Thomas
San Francisco	Elgin Stoddard
Savannah	B. J. Sams
Schenectady	M. F. Sayre
Susquehanna	Gordon Campbell
Syracuse	W. F. Ryan
Toledo	C. E. Fosler
Tri-Cities	W. P. Hunt
Utah	W. H. Trask, Jr.
Utica	R. W. Ayres
Virginia	J. S. A. Johnson
Washington, D. C.	A. E. Hanson
Waterbury	M. L. Martus
West Virginia	E. L. Hudson
Western Massachusetts	S. G. Shirley
Western Washington	R. H. G. Edmonds
Worcester	A. D. Putnam
Youngstown	R. J. Wean

STUDENT BRANCHES

(*For further information consult 1929 Membership List*)

Name and Location	Honorary Chairmen
Akron, Univ. of, Akron, Ohio	F. S. Griffin
Alabama Polytechnic Inst., Auburn, Ala.	C. R. Hixon
Arkansas, Univ. of, Fayetteville, Ark.	L. C. Price
Armour Inst. of Technology, Chicago, Ill.	J. C. Peebles
Brooklyn, Polytechnic Inst. of, Brooklyn, N. Y.	O. H. Henry
Brown Univ., Providence, R. I.	J. A. Hall
Bucknell Univ., Lewisburg, Pa.	G. M. Kunkel
California Inst. of Technology, Pasadena, Calif.	W. H. Clapp
California, Univ. of, Berkeley, Calif.	H. B. Langille
Carnegia Inst. of Technology, Pittsburgh, Pa.	T. G. Estep
Case School of Applied Science, Cleveland, Ohio	C. W. Coppersmith
Catholic Univ. of America, Washington, D. C.	George A. Weschler
Cincinnati, Univ. of, Cincinnati, Ohio	C. A. Joerger
Clemson College, Clemson College, S. C.	B. E. Fernow
Colorado Agricultural College, Fort Collins, Colo.	L. D. Crain
Colorado, Univ. of, Boulder, Colo.	S. L. Simmering
Columbia Univ., New York, N. Y.	R. T. Livingston
Cooper Union, New York, N. Y.	G. F. Bateman
Cornell Univ., Ithaca, N. Y.	F. O. Ellenwood
Delaware, Univ. of, Newark, Del.	R. L. Spencer
Drexel Inst., Philadelphia, Pa.	J H. Billings
Florida, Univ. of, Gainesville, Fla.	Melvin Price
George Washington Univ., Washington, D. C.	James H. Platt
Georgia School of Technology, Atlanta, Ga.	W. V. Dunkin
Idaho, Univ. of, Moscow, Idaho	H. F. Gauss
Illinois, Univ. of, Urbana, Ill.	G. A. Goodenough [1]

[1] Deceased, September 29, 1929.

Name and Location	Honorary Chairmen
Iowa State College, Ames, Ia	J. G. Hummel
Iowa, State Univ. of, Iowa City, Ia	Ralph M. Barnes
Johns Hopkins Univ., Baltimore, Md	H. W. Waterfall
Kansas State Agricultural College, Manhattan, Kan	J. P. Calderwood
Kansas, Univ. of, Lawrence, Kan	Earl D. Hay
Kentucky, Univ. of, Lexington, Ky	Carter C. Jett
Lafayette College, Easton, Pa	D. B. Prentice
Lehigh Univ., Bethlehem, Pa	Milton C. Stuart
Louisiana State Univ., Baton Rouge, La	Hamilton Johnson
Louisville, Univ. of, Louisville, Ky	D. C. Jackson, Jr.
Lowell Textile Inst., Lowell, Mass	H. J. Ball
Maine, Univ. of, Orono, Me	Irving H. Prageman
Marquette Univ., Milwaukee, Wis	John E. Schoen
Massachusetts Inst. of Technology, Cambridge, Mass	C. E. Fuller
Michigan State College, East Lansing, Mich	H. B. Dirks
Michigan, Univ. of, Ann Arbor, Mich	R. S. Hawley
Minnesota, Univ. of, Minneapolis, Minn	J. V. Martenis
Mississippi A. & M. College, A. & M. College, Miss	R. C. Carpenter
Missouri, Univ. of, Columbia, Mo	G. D. Newton
Montana State College, Bozeman, Mont	Eric Therkelsen
Nebraska, Univ. of, Lincoln, Neb	A. A. Luebs
Nevada, Univ. of, Reno, Nev	F. H. Sibley
Newark College of Engineering, Newark, N. J	J. Ansel Brooks
New Hampshire, Univ. of, Durham, N. H	E. L. Getchell
New York, College of City of, New York, N. Y	Arthur Bruckner
New York Univ., New York, N. Y	W. R. Bryans
North Carolina State College, Raleigh, N. C	W. J. Dana
North Carolina, Univ. of, Chapel Hill, N. C.[1]	
North Dakota Agri. College, Fargo, N. D.[1]	
North Dakota, Univ. of, Grand Forks, N. D	N. T. Bourke
Northeastern Univ., Boston, Mass	J. W. Zeller
Notre Dame, Univ. of, Notre Dame, Ind.[1]	
Ohio Northern Univ., Ada, Ohio	John A. Needy
Ohio State Univ., Columbus, Ohio	W. T. Magruder
Oklahoma A. & M. College, Stillwater, Okla	E. C. Baker
Oklahoma, Univ. of, Norman, Okla	J. H. Felgar
Oregon State Agricultural College, Corvallis, Ore	Wm. H. Paul
Pennsylvania State College, State College, Pa.	C. L. Allen
Pennsylvania, Univ. of, Philadelphia, Pa	G. E. Crofoot
Pittsburgh, Univ. of, Pittsburgh, Pa	John A. Dent
Porto Rico, Univ. of, Mayaguez, P. R	Ramon Gil
Pratt Inst., Brooklyn, N. Y	A. C. Harper
Princeton Univ., Princeton, N. J	A. M. Greene, Jr.
Purdue Univ., W. Lafayette, Ind	H. C. Hockema
Rensselaer Polytechnic Inst., Troy, N. Y	G. K. Palsgrove
Rice Inst., Houston, Tex	J. H. Pound
Rose Polytechnic Inst., Terre Haute, Ind	Carl Wischmeyer
Rutgers Univ., New Brunswick, N. J	F. E. Mehrhof
Santa Clara, Univ. of, Santa Clara, Calif	G. L. Sullivan
Southern California, Univ. of, Los Angeles, Calif	T. T. Eyre
Stanford Univ., Stanford University, Calif	A. B. Domonoske
Stevens Inst. of Technology, Hoboken, N. J	F. D. Furman
Swarthmore College, Swarthmore, Pa	C. G. Thatcher

[1] Established December, 1929.

Name and Location	Honorary Chairmen
Syracuse Univ., Syracuse, N. Y.	A. R. Acheson
Tennessee, Univ. of, Knoxville, Tenn.	W. R. Woolrich
Texas, A. & M. College of, College Station, Tex.	Ray Flagg
Texas, Univ. of, Austin, Tex.	B. E. Short
Tufts College, Tufts College, Mass.	W. E. Farnham
U. S. Naval Academy, P. G. Sch., Annapolis, Md.	P. J. Kiefer
Utah, Univ. of, Salt Lake City, Utah	E. H. Beckstrand
Vanderbilt Univ., Nashville, Tenn.	P. A. Cushman
Vermont, Univ. of, Burlington, Vt.	Edward Robinson [1]
Villanova College, Villanova, Pa.	J. S. Morehouse
Virginia Polytechnic Inst., Blacksburg, Va.	W. T. Ellis
Virginia, Univ. of, Charlottesville, Va.	A. F. Macconochie
Washington, State College of, Pullman, Wash.	A. C. Abell
Washington Univ., St. Louis, Mo.	Ernest Ohle
Washington, Univ. of, Seattle, Wash.	H. J. McIntyre
West Virginia Univ., Morgantown, W. Va.	H. M. Cather
Wisconsin, Univ. of, Madison, Wis.	G. L. Larson
Worcester Polytechnic Inst., Worcester, Mass.	G. H. MacCullough
Wyoming, Univ. of, Laramie, Wyo.	Robt. Rhoads
Yale Univ., New Haven, Conn.	S. W. Dudley

A.S.M.E. REPRESENTATIVES ON JOINT ACTIVITIES

Note.—*Dates in parentheses denote expiration of term*

American Association for the Advancement of Science

Section M, Engineering

Chas. Russ Richards — John T. Faig

Alternates may be appointed each year according to geographical location of meetings

American Engineering Council

Terms expire January 1, 1930

Alex Dow, *Detroit, Mich.*
L. P. Alford, *New York, N. Y.*
Harold V. Coes, *New York, N. Y.*
Arthur M. Greene, Jr., *Princeton, N. J.*
John Lyle Harrington, *Kansas City, Mo.*
Dexter S. Kimball, *Ithaca, N. Y.*
William S. Lee, *Charlotte, N. C.*
R. C. Marshall, Jr., *Washington, D. C.*

Terms expire January 1, 1931

E. O. Eastwood, *Seattle, Wash.*
Dean E. Foster, *Tulsa, Okla.*
O. P. Hood, *Washington, D. C.*
W. P. Hunt, *Moline, Ill.*
Charles Penrose, *Philadelphia, Pa.*
Frank A. Scott, *Cleveland, Ohio*
Elmer A. Sperry, *Chairman, Brooklyn, N. Y.*
Max Toltz, *St. Paul, Minn.*
Edward N. Trump, *Syracuse, N. Y.*
D. Robert Yarnall, *Vice-Chairman, Philadelphia, Pa.*

American Standards Association

S. G. Flagg, Jr. (1929)
Cloyd M. Chapman (1930)
C. P. Bliss (1931)[2]
K. H. Condit (alternate)
C. B. LePage (alternate)

[1] Deceased, August 2, 1929.
[2] Represents the A.S.M.E. on the Executive Committee of the A.S.A.

Engineering Foundation Board

Geo. A. Orrok (1930) D. Robert Yarnall (1931)
H. Hobart Porter (1932)[1]

International Electro-Technical Commission

U. S. National Committee

Fred R. Low C. H. Berry
W. F. Durand H. Birchard Taylor
Francis Hodgkinson

John Fritz Medal Board of Award

D. S. Jacobus (1929) Charles M. Schwab (1931)
Dexter S. Kimball (1930) Alex Dow (1932)

The terms of office expire in October of each year

Joseph A. Holmes Safety Association

Memorial Board

O. P. Hood

National Research Council

Division of Engineering

A. G. Christie (June, 1929) B. H. Blood (June, 1930)
R. J. S. Pigott (June, 1931)

Society for the Promotion of Engineering Education

Board of Investigation and Coordination

John Lyle Harrington E. M. Herr
W. L. Durand (alternate)

United Engineering Society

Roy V. Wright (1930) Edwards R. Fish (1931)
H. Hobart Porter (1932)

Western Society of Engineers

Washington Award

Horace Carpenter (June, 1929) Charles Piez (June, 1930)

[1] A.S.M.E. representative from Board of Trustees of U.E.S.

General Assignments

By special invitation the Society has representatives on:

George Washington Bicentennial Commission, GANO DUNN.
National Committee on Metals Utilization Department of Commerce, STANLEY G. FLAGG, JR., CHARLES M. MANLY (alternate).
National Conference on Street and Highway Safety, Department of Commerce, E. J. POSSELT.
Committee on Standardization Survey, CHARLES M. SCHWAB, H. BIRCHARD TAYLOR (alternate).
National Research Council, Highway Research Committee, J. G. BERGQUIST
National Screw Thread Commission, LUTHER D. BURLINGAME.
International High Commission, Advisory Committee to the U. S. Section, concerned with a preliminary study and compilation of a report on the use of Uniform Weights and Measures, R. E. FLANDERS.
U. S. Shipping Board, Fuel Conservation Board, H. L. SEWARD.
National Safety Council, American Society of Safety Engineers, Engineering Section, Study of Low Voltage Electrical Hazard, JOHN PRICE JACKSON.

Representations on the special committees of the American Welding Society and the American Bureau of Welding:

Welding of Pressure Vessels, W. F. DURAND, R. L. DAUGHERTY, E. R. FISH, SHERWOOD F. JETER, and D. S. JACOBUS.
Gas Welding Committee of the American Bureau of Welding, JAMES PARTINGTON and C. W. OBERT.
American Bureau of Welding Advisory Board to the National Research Council, JAMES PARTINGTON.
Structural Steel Welding, Advisory Committee to the American Bureau of Welding, GEO. A. ORROK.

PROFESSIONAL (TECHNICAL) COMMITTEES

(Revised to December 31, 1929)

Research

A.S.M.E. Research Committee (Standing) (5) *
Special Committee on Lubrication (10)
Subcommittee on Finance (1)
Subcommittee on Nominations (1)
Special Committee on Fluid Meters (13)
Subcommittee on Influence of Installation—Part 2 (5)
Subcommittee on Description of Flow Meters and Water Meters (3)
Subcommittee on Revision of Material on Pitot Tubes in Part 1 (2)
Subcommittee on Pulsating Flow (3)
Subcommittee on High Velocity Measurements (1)
Subcommittee on Revision of Part 1—Report on Fluid Meters (6)
Subcommittee on Revision of the Dimensional Analysis Section of Fluid Meter Report (3)
Special Committee on Thermal Properties of Steam (15)
Technical Subcommittee (9)

* NOTE.—The figures in parentheses indicate the number of men on each committee.

Special Committee on Strength of Gear Teeth (9)
Special Committee on Cutting of Metals (18)
- Advisory Committee (6)
- Subcommittee on Cooperation with Industries and Publicity (4)
- Subcommittee on Standards (4)
- Subcommittee on Research in Cutting Tools (4)
- Subcommittee on Properties of Materials (3)
- Subcommittee on Bibliography and Correlation (1)
- Subcommittee on Cutting Fluids (6)
- Subgroup on Finance (4)
- Subcommittee on Turning Processes (3)
- Subcommittee on Tungsten Carbide (1)

Special Committee on Mechanical Springs (18)
- Subcommittee on Present Status of the Art (7)
- Subcommittee on Program (10)
- Subcommittee on Spring Materials (1)
- Subcommittee on Bibliography (1)
- Executive Committee (5)

Joint Committee on Effect of Temperature on the Properties of Metals (11)
- Subcommittee No. 1 on Constitution, By-Laws and Membership (1)
- Subcommittee No. 2 on Finances (1)
- Subcommittee No. 3 on Projects (1)
- Subcommittee No. 4 on Correlation of Test Data (1)

Special Committee on Condenser Tubes (20)
- Executive Committee (6)
- Subcommittee on Questionnaire (3)
- Subcommittee on Finance (1)
- Subcommittee on Bibliography (2)

Joint Committee on Boiler Feedwater Studies (61)
- Executive Committee (21)
- Finance Committee (6)
- Subcommittee on Sedimentation with and without Chemicals, Pressure and Gravity Filters and Deconcentrators, Continuous Blow-Down Apparatus (5)
- Subcommittee on Water Softened by Chemicals (External Treatment) (9)
- Subcommittee on Zeolite Softeners, Internal Treatment, Priming and Foaming, Electrolytic Scale Prevention (13)
- Subcommittee on Surface Condensers, Evaporators and Deaerators (8)
- Subcommittee on Corrosion of Boilers and the Effect of Treated Water in Accelerating or Relieving These Troubles (15)
- Subcommittee on Embrittlement of Metals (12)
- Subcommittee on Municipal Water Supply in Relation to Boiler Use (12)
- Subcommittee on Standardization of Water Analysis (12)
- Subcommittee on Bibliography (8)

Special Committee on Boiler Furnace Refractories (18)
Special Committee on Elevators (9)
Special Committee on Worm Gears (8)
Joint Committee on Welding of Pressure Vessels (49)
- Executive Committee (8)
- Subcommittee on Methods of Test (11)
- Subcommittee on Procedure of Specifications (12)
- Subcommittee on Ways and Means (1)

Special Committee on Saws and Knives (10)

Special Committee on Existing Supplies of Hardwood (9)
Special Committee on Strength of Vessels under External Pressure (10)
Special Committee on Absorption of Radiant Heat in Boiler Furnaces (7)
Special Committee on Fuels (13)
Special Committee on Velocity Measurement of Fluid Flow (3)
Special Committee on Management Formula (6)
Joint Committee on Physical Constants of Refrigerants ( )
Special Committee on Diesel Fuel Oil Specifications (26)
- Subcommittee on Questionnaire to Manufacturers (3)
- Subcommittee on Questionnaire to Users (3)
- Subcommittee on Questionnaire to Oil Refiners (3)

Special Committee on Airplane Vibration with Special Reference to Instruments (14)
Special Committee on Heavy Duty Anti-Friction Bearings (8)
Special Committee on Removal of Ash of Molten Slag from Powdered-Coal Furnaces (8)
Representatives on Other Research Committees (12)

Standardization

A.S.M.E. Standardization Committee (Standing) (5)
Sectional Committee on Shafting (16)
- Subcommittee on Shafting Dimensions (4)
- Subcommittee on Stock Key Sizes (4)
- Subcommittee on Code for Design of Transmission Shafting (7)
- Subcommittee on Taper Keys (3)
- Subcommittee on Woodruff Keys (15)

Sectional Committee on Plain Limit Gages for General Engineering Work (20)
- Subcommittee on Tolerances, Allowances and Gages for Metal Fits (3)
- Subcommittee on Methods of Gaging and Specifications for Plain Limit Gages (4)
- Subcommittee on Gages, Their Limits, Manufacture and Use (5)
- Subcommittee on Editing (4)

Sectional Committee on Ball and Roller Bearings (16)
- Subcommittee on Annular Ball Bearings (7)
- Subcommittee on Annular Ball Bearings (Light, Medium and Heavy Series) (3)

Sectional Committee on Gears (31)
- Executive Committee (3)
- Subcommittee No. 1 on Program (3)
- Subcommittee No. 2 on Editing Reports (3)
- Subcommittee No. 3 on Nomenclature (6)
- Subcommittee No. 4 on Tooth Form (Spur Gear) (4)
- Subcommittee No. 5 on Helical Gears (9)
- Subcommittee No. 6 on Worm Gears (6)
- Subcommittee No. 7 on Bevel Gears (5)
- Subcommittee No. 8 on Materials (6)
- Subcommittee No. 9 on Inspection (3)
- Subcommittee No. 10 on Horse Power Rating (4)

Sectional Committee on Pipe Flanges and Fittings (55)
- Subcommittee No. 1 on Cast Iron Flanges and Flanged Fittings (34)
  - Subgroup on Cast Iron Flanges for Pressures under 100 lb. (8)
  - Subgroup on Ammonia Fittings (6)
- Subcommittee No. 2 on Screwed Fittings (26)
  - Working Committee (5)

Subcommittee No. 3 on Steel Flanges and Flanged Fittings (22)
Working Committee (10)
Subgroup on 1350 Lb. Steel Flanges and Flanged Fittings (4)
Subgroup on Bolting of Flanges (5)
Subgroup on Steel Companion Flanges (7)
Subcommittee No. 4 on Materials and Stresses (7)
Subcommittee No. 5 on Face-to-Face Dimensions of Ferrous Flanged Valves (14)
Subcommittee No. 6 on Malleable Iron or Steel Brass Seat Unions (25)
Subcommittee No. 7 on Rating of Pipe Fittings (10)
Subcommittee No. 8 on Marking of Pipe Fittings (7)
Sectional Committee on Bolt, Nut and Rivet Proportions (53)
Subcommittee No. 1 on Large and Small Rivets (9)
Subcommittee No. 2 on Wrench Head Bolts and Nuts (19)
Subgroup on Nomenclature (3)
Subgroup on Bolt Diameters (3)
Subgroup on Stud Bolts (3)
Subgroup on Wrench Openings (3)
Subcommittee No. 3 on Slotted Head Proportions (10)
Subcommittee No. 4 on Track Bolts and Nuts (9)
Subcommittee No. 5 on Round Unslotted Head Bolts (Carriage Bolts) (7)
Subcommittee No. 6 on Plow Bolts (5)
Subcommittee No. 7 on Body Dimensions and Material (11)
Subcommittee No. 8 on Nomenclature (10)
Subcommittee No. 9 on Socket Head Cap and Set Screws (10)
Sectional Committee on Scheme for Identification of Piping Systems (32)
Subcommittee on Identification by Colors (6)
Subcommittee on Classification (4)
Subcommittee on Identification Markings Other than Color (5)
Subcommittee on Editing (8)
Executive Committee (5)
Sectional Committee on Small Tools and Machine Tool Elements (18)
Executive Committee (5)
Technical Committee No. 1 on T-Slots (13)
Technical Committee No. 2 on Tool Holder Shanks and Tool Post Openings (15)
Technical Committee No. 3 on Machine Tapers (22)
Subgroup on Taper Series (8)
Subgroup on Standard Dimensions (3)
Subgroup on Detailed Dimensions, Tolerances and Gages (10)
Technical Committee No. 4 on Spindle Noses and Collets for Machine Tools (27)
Subgroup on Milling Machines, Small and Medium (3)
Subgroup on Large Milling Machines (8)
Subgroup on Grinding Machine Spindles (7)
Subgroup on Drilling Machines and Horizontal Boring Machines (8)
Subgroup on Turning Machines, Including Automatic Screw Machines, Lathes, Automatic Lathes, Turret Lathes, and Automatic Chucking Machines (14)
Subgroup on Cutting and Hobbing Machines (6)
Subgroup on Cutting Off Machines (3)

Technical Committee No. 5 on Milling Cutters (23)
Subgroup on Profile Cutters (4)
Subgroup on Keyways (4)
Subgroup on Nomenclature (4)
Subgroup on Limits (4)
Subgroup on Formed Cutters (4)
Subgroup on Hobs (4)
Subgroup on Inserted Tooth Cutters (4)
Technical Committee No. 6 on Designations and Working Ranges of Machine Tools (23)
Technical Committee No. 7 on Twist Drill Sizes (9)
Technical Committee No. 8 on Drill Bushings (9)
Technical Committee No. 9 on Punch and Die Holders (10)
Subgroup on Sizes and Dimensions (3)
Subgroup on Styles and Materials (3)
Technical Committee No. 10 on Circular Forming Tools and Holders ( )
Technical Committee No. 11 on Chucks and Chuck Jaws (9)
Subgroup on Master Chuck Jaws (5)
Subgroup on Adapters for Air Cylinders (4)
Technical Committee No. 12 on Cut and Ground Taps (7)
Technical Committee No. 13 on Splines and Splined Shafts (1)
Technical Committee No. 14 on Electric Welding Dies and Electrode Holders ( )

Sectional Committee on Scientific and Engineering Symbols and Abbreviations (33)
Executive Committee (7)
Subcommittee No. 1 on Symbols for Mechanics, Structural Engineering and Testing Materials (12)
Subcommittee No. 2 on Symbols for Hydraulics (13)
Subgroup on Theoretical Hydraulics (3)
Subgroup on Hydrology (2)
Subgroup on Water Power (2)
Subgroup on Pumps and Pumping Equipment (2)
Subgroup on Sanitary Engineering and Water Piping (2)
Subgroup on Irrigation (1)
Subgroup on Turbines (2)
Subcommittee No. 3 on Symbols for Heat and Thermodynamics (31)
Subcommittee No. 4 on Photometry and Illumination (15)
Subcommittee No. 5 on Aeronautical Symbols (11)
Subcommittee No. 6 on Mathematical Symbols (14)
Subcommittee No. 7 on Electrotechnical Symbols including Radio (15)
Subgroup on Letter Symbols (4)
Subgroup on Symbols for Electric Power including Interior Wiring (7)
Subgroup on Graphical Symbols for Radio (7)
Subgroup on Supply Material ( )
Subgroup on Traction including Railway Signaling (4)
Subgroup on Graphical Symbols for Telephone and Telegraph Use (5)
Subcommittee No. 8 on Navigational and Topographical Symbols (3)
Subcommittee No. 9 on Abbreviations for Engineering and Scientific Terms (5)

Sectional Committee on Plain and Lock Washers (28)
- Subcommittee No. 1 on Plain Washers (9)
- Subcommittee No. 2 on Lock Washers (21)

Sectional Committee on Machine Pins (13)
- Subcommittee No. 1 on Straight Taper and Dowel Pins ( )
- Subcommittee No. 2 on Split Pins ( )

Sectional Committee on Code for Pressure Piping (70)
- Subcommittee No. 1 on Plan and Scope (6)
- Subcommittee No. 2 on Power Piping (23)
  - Subgroup on Code for District Heating Piping (8)
- Subcommittee No. 3 on Hydraulic Piping (9)
  - Subgroup on Penstock Work ( )
  - Subgroup on Hydraulic High Pressure Piping ( )
  - Subgroup on Water Works Piping (1)
- Subcommmittee No. 4 on Gas and Air Piping (19)
- Subcommittee No. 5 on Refrigerating Piping (9)
- Subcommittee No. 6 on Oil Piping (8)
- Subcommittee No. 7 on Piping Materials (13)
- Subcommittee No. 8 on Fabrication Details (19)
  - Subgroup on Hangers ( )
  - Subgroup on Joints other than Welded (1)
  - Subgroup on Pipe Bends (1)
  - Subgroup on Power Piping (1)
  - Subgroup on Welding (2)

Sectional Committee on Standards for Drawings and Drafting Room Practice (52)
- Subcommittee No. 1 on Specifications for Paper and Cloth (14)
  - Subgroup on Materials Specification (3)
- Subcommittee No. 2 on Method of Indicating Dimensions (11)
- Subcommittee No. 3 on Lettering (9)
  - Subgroup on Questionnaire (2)
- Subcommittee No. 4 on Layout (11)
- Subcommittee No. 5 on Line Work (10)
- Subcommittee No. 6 on Graphical Symbols for Drawings (10)

Sectional Committee on Standards for Graphic Presentation (40)
- Subcommittee No. 1 on Plan and Scope (9)
- Subcommittee No. 2 on Terminology (7)
- Subcommittee No. 3 on Time Series Charts (7)
- Subcommittee No. 4 on Non-Time Series Charts (8)
- Subcommittee No. 5 on Survey of Current Practice (8)
- Subcommittee No. 6 on Engineering and Scientific Graphs (9)

Special Committee on Transmission Chains and Sprockets (17)
- Subcommittee on Roller Chain Standardization (7)
- Subcommittee on Silent Chain Standardization (8)

Sectional Committee on Wire and Sheet Metal Gaging Systems (28)
- Technical Committee on Flat Stocks (8)
- Technical Committee on Wires and Rods (9)
- Technical Committee on Tubing, Piping, Conduit and Casing (4)

Sectional Committee on Electric Motor Frame Dimensions (31)
- Working Committee (7)

Sectional Committee on Pipe Threads (45)
- Subcommittee No. 1 on Editing and Gaging (14)
- Subcommittee No. 2 on Taper Pipe Threads (9)
- Subcommittee No. 3 on Straight Pipe Threads (11)
  - Working Committee (2)

Subcommittee No. 4 on Plumbers' Threads, etc. (10)
Subgroup on Thread Pitch Diameters and Characteristics (1)
Subgroup to Study Existing Thread Dimensions of Cocks and Stops (3)
Subcommittee No. 5 on Screw Threads for Rigid Electric Conduit (6)
Subcommittee No. 6 on Special Threads for Thin Tubes (8)
Sectional Committee on Wrought Iron and Wrought Steel Pipe and Tubing (37)
Subcommittee No. 1 on Plan, Scope and Editing (5)
Subcommittee No. 2 on Pipe and Tubing for Low-Temperature Service (16)
Subcommittee No. 3 on Pipe and Tubing for High-Temperature Service (17)
Subgroup on Basic Formulas and Stresses (9)
Subcommittee No. 4 on Materials (17)
Sectional Committee on Speeds of Machinery (31)
Subcommittee No. 1 on Plan and Scope (7)
Subcommittee No. 2 on Questionnaire and Canvas to Industry (7)
Sectional Committee on Screw Threads for Fire Hose Couplings ( )
Sectional Committee on Screw Threads for Hose Coupling (26)
Subcommittee No. 1 on Hose Couplings for Fire Protective Purposes (7)
Subcommittee No. 2 on Hose Couplings for General Use (6)
Sectional Committee on Plumbing Equipment (31)
Subcommittee No. 1 on Plumbing Code (4)
Subcommittee No. 2 on Staple Vitreous China Plumbing Fixtures (12)
Subcommittee No. 3 on Staple Porcelain (All Clay) Plumbing Fixtures (10)
Subcommittee No. 4 on Enameled Sanitary Ware ( )
Subcommittee No. 5 on Traps (13)
Subgroup on Brass Lavatories and Sink Traps (8)
Subcommittee No. 6 on Standards for Brass Plumbing Products (13)
Subgroup on Compression Cocks, Washer Screws, Faucets and Tail Piece Parts (2)
Subgroup on Flushing Tank Mechanism and Flush Valves, Supply Pipes and Connections, and Escutcheons (2)
Subgroup on Fixture Connections and Fixture Valves, Waste Holes, Plugs and Connections; Overflows (3)
Subgroup on Valves (2)
Subgroup on Shower Heads, Diameter Connections and Sizes (3)
Subgroup on Water Works Brass (1)
Subgroup on Nomenclature (7)
Sectional Committee on Standardization and Unification of Screw Threads (33)
Subcommittee on Scope, Arrangement and Editing of American National Standard (7)
Subcommittee on Terminology and Thread Specifications except Gages (13)
Subcommittee on Special Threads and Twelve Pitch Series, except Gages (11)
Subcommittee on Acme and Other Similar Threads, except Gages (7)
Subcommittee on Screw Thread Gages (8)
Sectional Committee on Rolled Threads for Screw Shells of Electric Sockets and Lamp Bases (17)
Subcommittee No. 1 (9)

Sectional Committee on Stock Sizes, Shapes and Lengths for Hot and Cold Finished Iron and Steel Bars (14)
Representatives on Other Standards Committees (21)
Representation on American Standards Association (2)

Power Test Codes

Main Committee on Power Test Codes (Standing) (25)
Individual Committee No. 1 on General Instructions (4)
Individual Committee No. 2 on Definitions and Values (5)
Individual Committee No. 3 on Fuels (14)
Individual Committee No. 4 on Stationary Steam-Generating Units (5)
Individual Committee No. 5 on Reciprocating Steam Engines (6)
Individual Committee No. 6 on Steam Turbines (8)
Individual Committee No. 7 on Reciprocating Steam-Driven Displacement Pumps (9)
Individual Committee No. 8 on Centrifugal and Rotary Pumps (7)
Individual Committee No. 9 on Displacement Compressors and Blowers (7)
Individual Committee No. 10 on Centrifugal and Turbo-Compressors and Blowers (9)
Individual Committee No. 11 on Complete Steam Power Plants (8)
Individual Committee No. 12 on Condenser, Water-Heating and Cooling Equipment (7)
Individual Committee No. 13 on Refrigerating Systems (8)
Individual Committee No. 14 on Evaporating Apparatus (5)
Individual Committee No. 15 on Steam Locomotives (7)
Individual Committee No. 16 on Gas Producers (5)
Individual Committee No. 17 on Internal-Combustion Engines (6)
Individual Committee No. 18 on Hydraulic Power Plants and Their Equipment (13)
Individual Committee No. 19 on Instruments and Apparatus (17)
Individual Committee No. 20 on Speed-Responsive Governors (4)
Representatives on U. S. National Committee of the International Electrotechnical Commission (5)

Safety

A.S.M.E. Safety Committee (Standing) (5)
Sectional Committee on Safety Code for Mechanical Power Transmission Apparatus (27)
  Subcommittee for Detail Classification of Belts (3)
  Subcommittee for Modification of Rule 223 for Cone Pulley Belts (1)
  Subcommittee on Mechanical Power Control (13)
Sectional Committee on Safety Code for Elevators (37)
  Subcommittee on Research, Recommendations and Interpretations (10)
  Subcommittee on Inspectors Handbook (9)
  Subcommittee on Elevator Systems Safe against Fire (6)
Sectional Committee on Safety Code for Machinery for Compressing Air (28)
Sectional Committee on Safety Code for Conveyors and Conveying Machinery (46)
  Subcommittee No. 1 on All Types of Chain Conveyors and Elevators; also Cable Flight Conveyors, omitting Track Scraper Conveyors (7)
  Subcommittee No. 2 on Belt Conveyors and Belt Elevators, including Steel Belt (11)

Subcommittee No. 3 on Gravity Conveyors and Chutes, Live Roll Conveyors (8)
Subcommittee No. 4 on Spiral and Track or Scraper Conveyors (9)
Subcommittee No. 5 on Cable Conveyors (5)
Subcommittee No. 6 on Air, Steam or Liquid Conveyors (6)
Sectional Committee on Safety Code for Cranes, Derricks and Hoists (61)
Executive Committee (6)
Subcommittee No. 1 on Overhead and Gantry Cranes (22)
Subcommittee No. 2 on Locomotive and Tractor Cranes (17)
Subcommittee No. 3 on Derricks and Hoists (16)
Subcommittee No. 4 on Miscellaneous Equipment for Cranes and Hoists (21)
Subcommittee No. 5 on Jacks (8)
Representatives on Other Safety Code Committees (30)

Boiler Code

Main Committee on Boiler Code (23)
Executive Committee (7)
Subcommittee on Boilers of Locomotives (4)
Subcommittee on Care of Steam Boilers in Service (11)
Subcommittee on Heating Boilers (6)
Subcommittee on Material Specifications (4)
Conferring Committee of the American Society for Testing Materials (3)
Conferring Committee of the Association of American Steel Manufacturers (3)
Subcommittee on Miniature Boilers (6)
Subcommittee on Rules for Inspection (8)
Subcommittee on Unfired Pressure Vessels (4)
Subcommittee on Welding (12)
Conferring Committee of the American Welding Society (8)
Conference Committee (35)

Résumé

Total number of Committees	356
Total number of A.S.M.E. Members on Committees	712
Total number of Non-Members on Committees	888
Total number of Committee Members	1600

ORGANIZATIONS COOPERATING WITH A.S.M.E. TECHNICAL COMMITTEES

Actuarial Society of America
American Association for the Advancement of Science
The American Boiler Manufacturers Association
American Bureau of Welding
American Bureau of Shipping
American Ceramic Society
American Chemical Society
American Civic Association
American Drop Forging Institute
American Economic Association
American Electrochemical Society
American Electric Railway Association

American Erectors Association
American Foundrymen's Association
American Gas Association, Incorporated
American Gear Manufacturers' Association
American Granite Association
American Hardware Manufacturers Association
American Home Economics Association
American Hospital Association
American Hotel Association of the U. S. and Canada
American Institute of Architects
American Institute of Chemical Engineers
American Institute of Consulting Engineers
American Institute of Electrical Engineers
American Institute of Mining and Metallurgical Engineers
American Institute of Refrigeration
American Institute of Steel Construction
American Management Association
American Mathematical Society
The American Mining Congress
American Oil Burner Association
American Paint and Varnish Manufacturers' Association
American Paper and Pulp Association
American Petroleum Institute
American Physical Society
American Psychological Association
American Railway Association
    Engineering Division
        Rail Committee
        Track Committee
    Mechanical Division
    Signal Division
    Purchases and Stores Division
American Railway Car Institute
American Railway Tool Foremen's Association
American Refractories Institute
American Society for Testing Materials
American Society of Agricultural Engineers
American Society of Bakery Engineers
American Society of Civil Engineers
American Society of Heating and Ventilating Engineers
American Society of Naval Engineers
American Society of Refrigerating Engineers
American Society of Safety Engineers
American Society for Steel Treating
American Society of Sanitary Engineering
The American Specification Institute
American Statistical Association
American Steamship Owners' Association
American Supply and Machinery Manufacturers' Association
American Trade Association Executives
American Water Works Association
American Welding Society
American Zinc Institute, Incorporated
Artistic Lighting Equipment Association
Associated Factory Mutual Fire Insurance Companies
Associated General Contractors of America

The Association of American Steel Manufacturers
Association of Edison Illuminating Companies
Association of Electragists International
Association of Government Labor Officials of the U. S. and Canada
Association of Manufacturers of Wood Working Machinery
Bakery Equipment Manufacturers' Association
Bolt, Nut and Rivet Manufacturers Association
Building Managers and Owners Association
Canadian Engineering Standards Association
Cap or Set Screw Manufacturers Association
The Cast Iron Pipe Research Association
Casualty Actuarial Society
Chain Institute
Chamber of Commerce of the U. S. A.
Chlorine Institute Incorporated
Cold Finished Steel Bar Institute
The Commercial Lock Washer Statistical Bureau
Commonwealth of Pennsylvania Dept. of Labor and Industry
The Compressed Air Society
Compressed Gas Manufacturers' Association, Incorporated
Copper and Brass Research Association
Department of Labor and Industry of Massachusetts
Drill and Reamer Society
Electric Overhead Crane Institute
Elevator Manufacturers Association of New York
Elevator Manufacturers Association of U. S.
Federal Power Commission
Fire Equipment Manufacturer's Institute
Foundry Equipment Manufacturers Association
Georgia Ice Manufacturers Association
Grain Dealers National Association
Grinding Wheel Manufacturers Association of the U. S. and Canada
Heating and Piping Contractors' National Association
The Hydraulic Society
Illuminating Engineering Society
Industrial Commission of Ohio
Institute of American Meat Packers
Institute of Boiler and Radiator Manufacturers
Institute of Radio Engineers
International Acetylene Association
International Association of Fire Chiefs
International Association of Fire Engineers
International Association of Machinists
International Belting Conference
International Electro-Technical Commission
International Association of Industrial Accident Boards and Commissions
Laundryowners' National Association of the U. S. and Canada
Locomotive Crane Manufacturers' Association
Machinery Builders' Society
Manufacturers Standardization Society of the Valve and Fittings Industry
Master Boiler Makers' Association
The Mathematical Association of America
Millers' National Federation
Milling Cutter Society
National Academy of Sciences
National Advisory Committee for Aeronautics

National Association of Amusement Parks
National Association of Building Owners and Managers
National Association of Cost Accountants
The National Association of Cotton Manufacturers
National Association of Fan Manufacturers
National Association of Farm Equipment Manufacturers
National Association of Manufacturers of U. S. of America
National Association of Ice Industries
National Association of Master Plumbers of the U. S.
National Association of Mutual Casualty Companies
National Association of Practical Refrigerating Engineers
National Association of Purchasing Agents
National Association of Stationary Engineers
National Association of Steel Furniture Manufacturers
National Automatic Sprinkler Association
National Automobile Chamber of Commerce
National Board of Fire Underwriters
National Bureau of Casualty and Surety Underwriters
National Bureau of Economic Research Incorporated
National Coal Association
National Conference of Business Paper Editors
National Council on Compensation Insurance
National District Heating Association
National Electric Light Association
National Electrical Manufacturers Association
National Fire Protection Association
National Fire Waste Council
National Founders' Association
National Industrial Conference Board
National Machine Tool Builders' Association
National Metal Trades Association
National Paint, Oil and Varnish Association Incorporated
The National Pipe and Supplies Association
National Research Council
National Safety Council
National Slate Association
National Varnish Manufacturers Association
New England Water Works Association
New York State Department of Architects
New York State Department of Labor
Paint Manufacturers Association of the United States
Pipe Covering Contractors' Association
Pittsburgh Testing Laboratories
Portland Cement Association
Power Piping Society
Power Transmission Association
Printing Press Manufacturers Association
Rail Steel Bar Association
Railway Fire Protection Association
The Refrigerating Machinery Association
Retail Dry Goods Association
The Rubber Association of America
Screw Machine Products Association
The Silk Association of America Incorporated
Society for the Promotion of Engineering Education
Society of Automotive Engineers

Society of Industrial Engineers
Society of Naval Architects and Marine Engineers
Society of Ohio Safety Engineers
Society of Terminal Engineers
Soil Pipe Manufacturers Association
Southern Supply and Machinery Dealers Association
State of New Jersey Department of Labor
Steel Founders' Society of America
Stoker Manufacturers Association
Tank and Steel Plate Fabricators
Tap and Die Institute
Taylor Society
Technical Association of the Pulp and Paper Industry
Technical Publicity Association Incorporated
Terminal Elevator Grain Merchants Association
Underwriters Laboratories
United States Department of Agriculture
    Bureau of Agricultural Economics
United States Department of Commerce
    American Marine Standards Committee
    Bureau of Census
    Bureau of Standards
    Coast and Geodetic Survey
    Steamboat Inspection Service
    Bureau of Mines
United States Department of Interior
    Geological Survey
United States Department of Labor
    Bureau of Labor Statistics
United States Government Printing Office
United States Independent Telephone Association
United States Interstate Commerce Commission
United States Machine Screw Service Bureau
United States Navy Department
    Bureau of Construction and Repair
    Bureau of Engineering
    Bureau of Yards and Docks
    Design Division
United States Post Office Department
United States Treasury Department
    Bureau of the Public Health Service
United States War Department
    Air Corps
    Ordnance Department
United States Weather Bureau
Water Works Manufacturers Association

HONORARY MEMBERS

	Elected
Sir John Audley Frederick Aspiwall	1911
William Wallace Atterbury	1925
Mortimer Elwyn Cooley	1928
Charles de Fréminville	1919
Thomas Alva Edison	1904
Rear-Admiral Robert Stanislaus Griffin	1920
Nathanael Greene Herreshoff	1921
Ira Nelson Hollis	1928
Honorable Herbert Clark Hoover	1925
Masawo Kamo	1929
Henri Le Chatelier	1927
Honorable Sir Charles Algernon Parsons	1920
Grande Ufficiale Ing. Pio Perrone	1920
Auguste C. E. Rateau	1919
Charles M. Schwab	1918
Viscount Eiichi Shibusawa	1929
Ambrose Swasey	1916
William Cawthorne Unwin	1898
Samuel Matthews Vauclain	1920
Oskar von Miller	1912
Right Honorable Lord Weir	1920
Orville Wright	1918
Sir Alfred Fernandez Yarrow	1914

Honorary Members in Perpetuity

Alexander Lyman Holley, Founder of the Society. Died 1882.
John Edson Sweet, Founder of the Society. Died 1916.
Henry Rossiter Worthington, Founder of the Society. Died 1880.

Deceased Honorary Members

	Elected	Died
Horatio Allen	1880	1889
Sir William Arrol	1905	1913
Sir Benjamin Baker	1886	1907
Johann Bauschinger	1884	1893
Sir Henry Bessemer	1891	1898
Sir Frederick Joseph Bramwell	1884	1903
John Alfred Brashear	1908	1920
Gustave Canet	1900	1908
Andrew Carnegie	1907	1919
Daniel Kinnear Clark	1882	1896
Rudolph Julius Emmanuel Clausius	1882	1888
Sir John Coode	1889	1892
Peter Cooper	1882	1883
Carl Gustaf Patrik de Laval	1912	1913
Rudolph Diesel	1912	1913
James Dredge	1886	1906
Victor Dwelshauvers-Dery	1886	1913
Alexandre Gustave Eiffel	1889	1923
Marshal Ferdinand Foch	1921	1929
Sir Charles Douglas Fox	1900	1921
John Fritz	1900	1913
Major-General George Washington Goethals	1917	1928
Franz Grashof	1884	1893
Otto Hallauer	1882	1883
Charles Haynes Haswell	1905	1907
Friedrich Gustav Herrmann	1884	1907
Gustav Adolph Hirn	1882	1890
Joseph Hirsch	1889	1901
Robert Woolston Hunt	1920	1923
Benjamin Franklin Isherwood	1894	1915
Henri Léauté	1891	1916
Erasmus Darwin Leavitt	1915	1916
Anatole Mallet	1912	1919
Charles H. Manning	1913	1919
Rear Admiral George Wallace Melville	1910	1912
Charles Talbot Porter	1890	1910
Sir Edward J. Reed	1882	1906
Franz Reuleaux	1882	1905
Henri Adolphe-Eugene Schneider	1882	1898
C. William Siemens	1882	1883
Henry Robinson Towne	1921	1924
Henri Tresca	1882	1885
Francis A. Walker	1886	1897
Worcester Reed Warner	1925	1929
Sir William Henry White	1900	1913
George Westinghouse	1897	1914

PAST OFFICERS

ALEXANDER LYMAN HOLLEY, Chairman of the Preliminary Meeting for Organization of The American Society of Mechanical Engineers,
Died January 29, 1882

Presidents

1880-1882	ROBERT HENRY THURSTON	Died October 25, 1903
1883	ERASMUS DARWIN LEAVITT	Died March 11, 1916
1884	JOHN EDSON SWEET	Died May 8, 1916
1885	JOSEPHUS FLAVIUS HALLOWAY	Died September 1, 1896
1886	COLEMAN SELLERS	Died December 28, 1907
1887	GEORGE H. BABCOCK	Died December 16, 1893
1888	HORACE SEE	Died December 14, 1909
1889	HENRY ROBINSON TOWNE	Died October 15, 1924
1890	OBERLIN SMITH	Died July 19, 1926
1891	ROBERT WOOLSTON HUNT	Died July 11, 1923
1892	CHARLES HARDING LORING	Died February 5, 1907
1893-1894	ECKLEY BRINTON COXE	Died May 13, 1895
1895	EDWARD F. C. DAVIS	Died August 6, 1895
1895	CHARLES ETHAN BILLINGS	Died June 4, 1920
1896	JOHN FRITZ	Died February 13, 1913
1897	WORCESTER REED WARNER	Died June 25, 1929
1898	CHARLES WALLACE HUNT	Died March 27, 1911
1899	GEORGE WALLACE MELVILLE	Died March 17, 1912
1900	CHARLES HILL MORGAN	Died January 10, 1911
1901	SAMUEL T. WELLMAN	Died July 11, 1919
1902	EDWIN REYNOLDS	Died February 19, 1909
1903	JAMES MAPES DODGE	Died December 4, 1915
1904	AMBROSE SWASEY	Cleveland, Ohio
1905	JOHN RIPLEY FREEMAN	Providence, R. I.
1906	FREDERICK WINSLOW TAYLOR	Died March 21, 1915
1907	FREDERICK REMSEN HUTTON	Died May 14, 1918
1908	MINARD LAFEVER HOLMAN	Died January 4, 1925
1909	JESSE MERRICK SMITH	Died April 1, 1927
1910	GEORGE WESTINGHOUSE	Died March 12, 1914
1911	EDWARD DANIEL MEIER	Died December 15, 1914
1912	ALEXANDER CROMBIE HUMPHREYS	Died August 14, 1927
1913	WILLIAM FREEMAN MYRICK GOSS	Died March 23, 1928
1914	JAMES HARTNESS	Springfield, Vt.
1915	JOHN ALFRED BRASHEAR	Died April 8, 1920
1916	DAVID SCHENCK JACOBUS	New York, N. Y.
1917	IRA NELSON HOLLIS	Cambridge, Mass.
1918	CHARLES THOMAS MAIN	Boston, Mass.
1919	MORTIMER ELWYN COOLEY	Ann Arbor, Mich.
1920	FRED J. MILLER	Center Bridge, Pa.
1921	EDWIN S. CARMAN	Cleveland, Ohio
1922	DEXTER SIMPSON KIMBALL	Ithaca, N. Y.
1923	JOHN LYLE HARRINGTON	Kansas City, Mo.
1924	FREDERICK ROLLINS LOW	New York, N. Y.
1925	WILLIAM FREDERICK DURAND	Stanford Univ., Calif.
1926	WILLIAM LAMONT ABBOTT	Chicago, Ill.
1927	CHARLES M. SCHWAB	New York, N. Y.
1928	ALEX DOW	Detroit, Mich.
1929	ELMER AMBROSE SPERRY	Brooklyn, N. Y.

NOTE.—According to the Constitution, Article C7, Sec. 2, the last five surviving Past-President are members of the Council.

Vice-Presidents

HENRY ROSSITER WORTHINGTON
April-December, 1880
COLEMAN SELLERS
April, 1880-November, 1881
ECKLEY B. COXE
April, 1880-November, 1881
QUINCY A. GILMORE
April, 1880-December, 1880
WM. H. SHOCK
April, 1880-November, 1882
ALEXANDER L. HOLLEY
April, 1880-January, 1882
FRANCIS A. PRATT
December, 1880-November, 1881
THEO. N. ELY..1881-November, 1882
WASHINGTON JONES
1881-November, 1882
WM. P. TROWBRIDGE
1881-November, 1883
E. D. LEAVITT..1881-December, 1882
CHAS. E. EMERY.....1881-1883
S. B. WHITING.....1882-1883
JOHN FRITZ 1882-1884
HENRY MORTON 1882-1884
WM. METCALF 1882-1884
A. B. COUCH.....1883-1885
W. R. ECKART.....1883-1885
J. V. MERRICK.....1883-1885
CHAS. W. COPELAND.....1884-1886
HENRY R. TOWNE.....1884-1886
COLEMAN SELLERS.....1884-1885
OLIN H. LANDRETH.....1885-1886
ALLAN STIRLING 1885-1887
HORACE SEE 1885-1887
CHAS. H. LORING.....1885-1887
JOS. MORGAN, JR.....1886-1888
CHAS. T. PORTER.....1886-1888
HORACE S. SMITH.....1886-1888
W. S. G. BAKER.....1887-1889
H. G. MORRIS.....1887-1889
C. J. H. WOODBURY.....1887-1889
THOS. J. BORDEN.....1888-1890
WILLIAM KENT 1888-1890
CHARLES B. RICHARDS.....1888-1890
DE VOLSON WOOD.....1889-1891
JOEL SHARP 1889-1891
GEO. W. WEEKS.....1889-1891
STEPHEN W. BALDWIN....1890-1892
ALEX. GORDON 1890-1892
JNO. F. PARKHURST.....1890-1892
GEORGE I. ALDEN.....1891-1893
E. F. C. DAVIS.....1891-1893
IRVING M. SCOTT.....1891-1893
CHARLES WALLACE HUNT..1892-1894
EDWIN REYNOLDS 1892-1894
THOS. R. PICKERING.....1892-1894
PERCIVAL ROBERTS, JR.....1893-1895
H. J. SMALL.....1893-1895
CHARLES E. BILLINGS.....1893-1895
FRANK H. BALL.....1894-1896
M. L. HOLMAN.....1894-1896
JESSE M. SMITH.....1894-1896
FRANCIS W. DEAN.....1895-1897
CHARLES H. MANNING.....1895-1897
GEORGE W. MELVILLE.....1895-1897
EDWIN S. CRAMP.....1896-1898
W. F. DURFEE.....1896-1898
S. T. WELLMAN.....1896-1898
CHARLES M. JARVIS.....1897-1899
WALTER S. RUSSEL.....1897-1899
JOHN C. KAFER.....1897-1899
E. D. MEIER.....1898-1900
GEORGE R. STETSON.....1898-1900
B. H. WARREN.....1898-1900
JESSE M. SMITH.....1899-1901
STEVENSON TAYLOR 1899-1901
DAVID TOWNSEND 1899-1901
JAMES M. DODGE.....1900-1902
AMBROSE SWASEY 1900-1902
ARTHUR M. WAITT.....1900-1902
M. E. COOLEY.....1901-1903
WILFRED LEWIS 1901-1903
M. P. HIGGINS.....1901-1903
JAMES CHRISTIE 1902-1904
F. H. DANIELS.....1902-1904
JOHN R. FREEMAN.....1902-1904
D. S. JACOBUS.....1903-1905
WILLIAM J. KEEP.....1903-1905
M. L. HOLMAN.....1903-1905
S. M. VAUCLAIN.....1904-1906
H. H. WESTINGHOUSE.....1904-1906
FRED. W. TAYLOR.....1904-1905
GEO. W. BARRUS.....1905-1906
WALTER M. MCFARLAND...1905-1907
ROBT. C. MCKINNEY.....1905-1907
EDWARD N. TRUMP.....1905-1907
PHILETUS W. GATES.....1906-1908
JOHN W. LIEB, JR.....1906-1908
ALEX DOW 1906-1908
L. P. BRECKENRIDGE.....1907-1909
FRED J. MILLER.....1907-1909
ARTHUR WEST 1907-1909
GEO. M. BOND.....1908-1910
R. C. CARPENTER.....1908-1910
F. M. WHYTE.....1908-1910
CHAS. WHITING BAKER...1909-1911
W. F. M. GOSS.....1909-1911
E. D. MEIER.....1909-1910
ALEX. C. HUMPHREYS.....1910-1911
GEO. M. BRILL.....1910-1912
EDWIN M. HERR.....1910-1912
HENRY H. VAUGHAN.....1910-1912
WM. F. DURAND.....1911-1913
IRA N. HOLLIS.....1911-1913
THOS. B. STEARNS.....1911-1913
I. E. MOULTROP.....1912-1914
HENRY G. STOTT.....1912-1914
JAMES HARTNESS.....1912-1913
E. B. KATTE.....1913-1914
H. L. GANTT.....1913-1915
E. E. KELLER.....1913-1915
H. G. REIST.....1913-1915
HENRY HESS 1914-1916
GEO. W. DICKIE.....1914-1916

James E. Sague.....1914-1916
Wm. B. Jackson.....1915-1917
J. Sellers Bancroft.....1915-1917
Julian Kennedy 1915-1917
Charles H. Benjamin....1916-1918
Arthur M. Greene, Jr...1916-1918
Charles T. Plunkett....1916-1918
Spencer Miller 1917-1919
Max Toltz 1917-1919
John Hunter.....1917-1919
Fred R. Low.....1918-1920
Henry B. Sargent.....1918-1920
John A. Stevens.....1918-1920
John R. Allen [1].....1920-1921
William B. Gregory [2]....1920-1921
Robert H. Fernald.....1919-1921
Edward C. Jones.....1919-1921
Leon P. Alford.....1920-1922
John L. Harrington.....1920-1922
Robert B. Wolf.....1920-1922
E. A. Deeds.....1921-1923
Robert Sibley 1921-1923
L. E. Strothman [3].....1921-1922
Arthur L. Rice [4].....1922
H. H. Vaughan [5] 1923
Walter S. Finlay, Jr.....1922-1924
Wm. H. Kenerson.....1922-1924
Earl F. Scott.....1922-1924
George I. Rockwood.....1923-1925
W. J. Sando.....1923-1925
H. Birchard Taylor.....1923-1925
Robert W. Angus.....1924-1926
Sherwood F. Jeter.....1924-1926
Thos. L. Wilkinson.....1924-1926
A. G. Christie.....1925-1927
Wm. T. Magruder.....1925-1927
Roy V. Wright.....1925-1927
H. V. Coes [6].....1927
Charles L. Newcomb.....1926-1928
E. O. Eastwood.....1926-1928
Edwards R. Fish.....1926-1928
John H. Lawrence.....1927-1929
E. A. Muller.....1927-1929
Newell Sanders 1927-1929
Paul Wright 1927-1929
Robert L. Daugherty....1928-1930
William Elmer 1928-1930
Charles E. Gorton.....1928-1930
Paul Doty 1929-1931
Ernest L. Jahncke.....1929-1931
Conrad N. Lauer.....1929-1931
Ralph E. Flanders.....1929-1931

Managers

Wm. P. Trowbridge
April, 1880-November, 1881
Theo. N. Ely
April, 1880-November, 1881
J. C. Hoadley
April, 1880-November, 1881
Washington Jones
April, 1880-November, 1881
Wm. B. Cogswell
April, 1880-November, 1882
Chas. B. Richards
April, 1880-November, 1882
S. B. Whiting
April, 1880-November, 1882
E. D. Leavitt, Jr.
April, 1880-November, 1882
J. F. Holloway
November, 1880-November, 1883
Geo. W. Fisher
November, 1880-November, 1883
Allan Stirling
November, 1881-November, 1884
Geo. H. Babcock
1881-November, 1884
S. W. Robinson, 1881-November,1884
John E. Sweet.....1882-1883
Robt. W. Hunt.....1882-1885
Chas. T. Porter.....1882-1885
C. J. H. Woodbury.....1882-1885
W. F. Durfee.....1883-1886
Oberlin Smith 1883-1886
C. C. Worthington.....1883-1886
Wm. Lee Church.....1884-1887
Wm. Hewitt.....1884-1887
Chas. H. Morgan.....1884-1887
Hamilton A. Hill.....1885-1888
William Kent 1885-1888
Saml. T. Wellman.....1885-1888
John T. Hawkins.....1886-1889
Fredk. G. Coggin.....1886-1889
Thos. R. Morgan, Sr.....1886-1889
Stephen W. Baldwin.....1887-1890
Fredk. Grinnell.....1887-1890
Morris Sellers 1887-1890
Frank H. Ball.....1888-1891
Geo. M. Bond.....1888-1891
Wm. Forsyth.....1888-1891
Jas. E. Denton.....1889-1892
Carleton W. Nason.....1889-1892
H. H. Westinghouse.....1889-1892

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[1] Deceased, October 26, 1920.
[2] Elected to fill unexpired term of John R. Allen.
[3] Deceased, May 8, 1922.
[4] Elected to fill vacancy caused by death of L. E. Strothman.
[5] Elected to complete term of L. E. Strothman, deceased.
[6] Under Amendments to Constitution, providing for seven Vice-Presidents (formerly only six).

ANDREW FLETCHER 1890-1893
WORCESTER R. WARNER....1890-1893
COLEMAN SELLERS, JR.....1890-1893
JAS. M. DODGE.....1891-1894
ROBT. FORSYTH 1891-1894
JESSE M. SMITH.....1891-1894
JOHN THOMPSON 1892-1895
CHARLES W. PUSEY.....1892-1895
CHARLES H. MANNING.....1892-1895
JOHN B. HERRESHOFF.....1893-1896
LEBBEUS B. MILLER.....1893-1896
WALTER S. RUSSEL.....1893-1896
CHARLES A. BAUER.....1894-1897
ARTHUR C. WALWORTH....1894-1897
JOHN C. KAFER.....1894-1897
GEO. W. DICKIE.....1895-1898
E. D. MEIER.....1895-1898
NORMAN C. STILES.....1895-1898
A. WELLS ROBINSON.....1896-1899
H. S. HAINES.....1896-1899
G. C. HENNING.....1896-1899
J. B. STANWOOD.....1897-1900
H. H. SUPLEE.....1897-1900
GEO. RICHMOND 1897-1900
EDGAR C. FELTON.....1898-1901
A. M. GOODALE.....1898-1901
RICHARD H. SOULE.....1898-1901
FRANCIS H. BOYER.....1899-1902
JOHN A. BRASHEAR.....1899-1902
ALFRED H. RAYNAL.....1899-1902
W. F. M. GOSS.....1900-1903
D. S. JACOBUS.....1900-1903
DE COUREY MAY.....1900-1903
CHARLES H. CORBETT.....1901-1904
H. A. GILLIS.....1901-1904
R. S. MOORE.....1901-1904
ROBERT C. MCKINNEY.....1902-1905
NEWELL SANDERS 1902-1905
S. S. WEBBER.....1902-1905
JOHN W. LIEB, JR.....1903-1906
ASA M. MATTICE.....1903-1906
GEO. I. LOCKWOOD.....1903-1906
GEORGE M. BRILL.....1904-1907
FRED J. MILLER.....1904-1907
RICHARD H. RICE.....1904-1907
WALTER LAIDLAW 1905-1908
FRED. M. PRESCOTT.....1905-1908
FRANK G. TALLMAN.....1905-1908
G. M. BASFORD.....1906-1909
ANDREW J. CALDWELL.....1906-1909
ANDREW L. RIKER.....1906-1909
WM. L. ABBOTT.....1907-1910
ALEX. C. HUMPHREYS.....1907-1910
HENRY G. STOTT.....1907-1910
H. L. GANTT.....1908-1911
I. E. MOULTROP.....1908-1911
W. J. SANDO.....1908-1911
J. SELLERS BANCROFT.....1909-1911
JAMES HARTNESS 1909-1912
H. G. REIST.....1909-1912
HENRY G. STOTT.....1911-1912
D. F. CRAWFORD.....1910-1913
STANLEY G. FLAGG, JR.....1910-1913
E. B. KATTE.....1910-1913
CHARLES J. DAVIDSON.....1911-1914
HENRY HESS 1911-1914
GEORGE A. ORROK.....1911-1914
ALFRED NOBLE 1912-1914
MORRIS L. COOKE.....1914-1915
W. B. JACKSON.....1912-1915
H. M. LELAND.....1912-1915
ARTHUR M. GREENE, JR....1913-1916
JOHN HUNTER 1913-1916
ELLIOTT H. WHITLOCK....1913-1916
CHARLES T. MAIN.....1914-1917
SPENCER MILLER 1914-1917
MAX TOLTZ 1914-1917
JOHN H. BARR.....1915-1918
H. DE B. PARSONS.....1915-1918
JOHN A. STEVENS.....1915-1918
ROBERT H. FERNALD.....1916-1919
WILLIAM B. GREGORY.....1916-1919
C. R. WEYMOUTH.....1916-1919
FRED A. GEIER.....1917-1920
FRED. N. BUSHNELL.....1917-1920
D. ROBERT YARNALL.....1917-1920
CHARLES L. NEWCOMB....1918-1921
CHARLES RUSS RICHARDS..1918-1921
FRANK O. WELLS.....1918-1921
ELBERT C. FISHER.....1919-1922
EARL F. SCOTT.....1919-1922
DEXTER S. KIMBALL.....1919-1921
L. C. NORDMEYER.....1920-1923
HENRY M. NORRIS.....1920-1923
CARL C. THOMAS.....1920-1923
SHERWOOD F. JETER.....1921-1924
HORACE P. LIVERSIDGE....1921-1924
HOLLIS P. PORTER.....1921-1924
A. G. CHRISTIE.....1922-1925
JAMES H. HERRON.....1922-1925
ROY V. WRIGHT.....1922-1925
E. O. EASTWOOD.....1923-1926
E. R. FISH.....1923-1926
FRANK A. SCOTT.....1923-1926
JOHN H. LAWRENCE.....1924-1927
EDWARD A. MULLER.....1924-1927
PAUL WRIGHT 1924-1927
ROBT L. DAUGHERTY.....1925-1928
WM. ELMER 1925-1928
CHAS. E. GORTON.....1925-1928
PAUL DOTY 1926-1929
RALPH E. FLANDERS.....1926-1929
CONRAD N. LAUER.....1926-1929
FREDERICK H. DORNER.....1927-1930
WILLIAM A. HANLEY.....1927-1930
L. B. MCMILLAN [1].....1927-1929
HARVEY N. DAVIS [2].....1929-1930
CHARLES M. ALLEN.....1928-1931
ROBERT M. GATES.....1928-1931
ELY C. HUTCHINSON.....1928-1931
JAMES D. CUNNINGHAM....1929-1932
CLARENCE F. HIRSHFIELD..1929-1932
HAROLD V. COES.....1929-1932

[1] Deceased, August 10, 1929.
[2] Elected to fill unexpired term of L. B. McMillan.

Treasurers

LYCURGUS B. MOORE.....April, 1880—December, 1881
CHAS. W. COPELAND.....December, 1881—November, 1884
WILLIAM H. WILEY.....1884—1925
ERIK OBERG.....1925—date

Secretaries

SAM S. WEBBER, JR.....Secretary organization meeting.....1880
LYCURGUS B. MOORE.....Acting Secretary.....April—November, 1880
THOS. WHITESIDE RAE.....November, 1880—March, 1883
FREDERICK R. HUTTON.....1883—1906
CALVIN W. RICE.....1906—date

SUMMARY OF MEMBERSHIP

(*January 2, 1930*)

Membership by Residence

UNITED STATES AND POSSESSIONS

Alabama	117	Nebraska	30
Alaska	1	Nevada	4
Arizona	17	New Hampshire	34
Arkansas	16	New Jersey	1507
California	812	New Mexico	2
Canal Zone	4	New York	4685
Colorado	91	North Carolina	95
Connecticut	611	North Dakota	4
Delaware	101	Ohio	1258
District of Columbia	179	Oklahoma	85
Florida	66	Oregon	62
Georgia	128	Pennsylvania	2165
Hawaiian Islands	25	Philippine Islands	27
Idaho	9	Porto Rico	31
Illinois	1169	Rhode Island	165
Indiana	333	South Carolina	35
Iowa	55	South Dakota	5
Kansas	66	Tennessee	113
Kentucky	62	Texas	224
Louisiana	101	Utah	42
Maine	40	Vermont	39
Maryland	214	Virginia	158
Massachusetts	1092	Washington	128
Michigan	634	West Virginia	59
Minnesota	132	Wisconsin	399
Mississippi	21	Wyoming	9
Missouri	346		
Montana	13	Total	17821

Other Countries

North America		
Canada	282	
Newfoundland	1	
Mexico	30	
		313
Central America		
Costa Rica	4	
Guatemala	1	
Panama	1	
		6
West Indies		
Aruba	3	
Bermuda	1	
Cuba	44	
Dominican Republic	7	
Haiti	2	
Jamaica	1	
Trinidad	1	
		59
South America		
Argentina	21	
Bolivia	1	
Brazil	18	
British Guiana	2	
Chili	27	
Columbia	8	
Ecuador	1	
Peru	7	
Uruguay	2	
Venezuela	4	
		91
Africa		
Egypt	2	
Liberia	1	
Northern Rhodesia	3	
Union of South Africa	9	
		14
Asia		
Ceylon	1	
China	20	
Dutch East Indies	2	
Federated Malay States	1	
India	50	
Japan	33	
Manchuria	1	
Persia	2	
Siam	1	
Straits Settlements	1	
		112
Australasia		
Australia	34	
New Zealand	6	
		40
Europe		
Austria	3	
Belgium	3	
Czechoslovakia	8	
Denmark	6	
Finland	3	
France	39	
Germany	54	
Great Britain	114	
Greece	1	
Holland	4	
Hungary	1	
Italy	7	
Norway	4	
Poland	3	
Portugal	1	
Roumania	2	
Spain	6	
Sweden	10	
Switzerland	10	
Syria	1	
Turkey	2	
Union of Soviet Socialist Republics	5	
		287
Total		922

Summary of Membership by Residence

Membership in United States	17821
Membership in Other Countries	922
Present Address Unknown	3
Total Membership	18746

Summary of Membership by Grades

Honorary Members	24
Members	8633
Associates	607
Associate-Members	3978
Juniors	5504
Total	18746

ANNUAL REPORTS OF COUNCIL AND COMMITTEES

REPORT OF COUNCIL

SUMMARY

THE achievements of the Society, described in the reports of the groups of members organized in its many committees, make an impressive document filled with indications of valuable service rendered to the individual members and to the industries which they represent. It is impossible to evaluate these achievements in any measurable way. The Society is large and exerts a powerful influence, but its contribution to engineering thinking and development is valuable in direct proportion to the number of members who are giving time and thought to the benefit of their fellow engineers. A study of the reports of the Standing Committees will quickly reveal the large number of members who are mobilized in the work of the Society.

One significant fact is the increase in important international contacts. During the year, the Society participated in the Paris Conference on Scientific Management, the London meeting of the Advisory Committee on Steam Turbines of the International Electrotechnical Commission (a conference in London of representatives of four countries engaged in research in the properties of steam), and was active in preparations for the World Engineering Congress and World Power Conference in Tokyo in November, 1929. Mr. Elmer A. Sperry, President of the A.S.M.E., acted as Chairman of the American Committee for this Congress and guided the preliminary activities which included the provision of a large program, the organization of a special trip in which about 250 Americans participated, and the entertainment of European engineers who passed through the United States on their way to Japan.

A joint research on fluid flow was inaugurated with the Verein Deutscher Ingenieure, and the adoption of the A.S.M.E. Boiler Code by the City of Mexico is reported.

Through the generosity of John R. Freeman, Past-President, A.S.M.E., the Society was able to publish a monumental work on "Hydraulic Laboratory Practice," containing excellent descriptions of the hydraulic laboratories of Europe, collected through the cooperation of the Verein Deutscher Ingenieure.

The Society headquarters has entertained numerous engineer visitors from all over the world.

The normal activities of the Society showed satisfactory growth. It is especially noteworthy that five meetings of the Society were held at widely separated points, giving greater opportunity for members to participate. The Professional Divisions held 13 meetings with strong programs, the 70 Local Sections met 407 times, and the 96 Student Branches reported 618 gatherings. The organization of the Society was extended by the installation of one Local Section and three Student Branches. Preliminary plans were completed for the establishment of an office in the Middle West. The net gain in membership was 689 and $55,655.23 was added to the Reserve account. The publications reported a successful year, *Mechanical Engineering* continuing in its policy of providing stimulating content for all members, the Transactions for 1927 and 1928 appearing in the new form, the Record and Index coming out with many improvements, Mechanical Catalog, as the Condensed Catalogues is now called, having a still larger number of pages, and the new Engineering Index in complete form making its first appearance. Worthy of special mention are the publication of the Dictionary of Aeronautical Terms, the designation of the Aeronautics section of Transactions as *Aeronautical Engineering,* the completion of a biography of Robert Henry Thurston by Dr. William F. Durand, Past-President, A.S.M.E., and the publication of the Lincoln Prize Papers on Arc Welding.

Seven hundred members of the Society, associated with 900 other engineers, are contributing to the advancement of the profession by the work of the technical committees, on Research, Standardization, Power Test Codes, Safety, and Boiler Code. The activities of these groups cover the field of mechanical engineering in its broadest aspects and the published reports and projects in process give assurance that the Society is meeting fully its responsibility in this field of service. During the year eight standards and codes were completed and issued in pamphlet form.

The Employment Service conducted jointly with the A.S.C.E., A.I.M.E., and A.I.E.E. has experienced its most successful year, measured both from the viewpoint of service rendered and reduction in net cost to the societies. This has made possible a further extension of the service rendered by the New York, Chicago, and San Francisco offices, and negotiations are being conducted with other localities looking toward the establishment of offices in two other cities.

The effectiveness of the American Engineering Council has been increased by the adherence of the American Society of Civil Engineers as a member body.

The accompanying table shows the changes in membership for the past fiscal year. The report of the Membership Committee gives additional facts about the number of applications received and passed for membership.

Honorary memberships have been conferred on His Excellency Viscount Eiichi Shibusawa of Tokyo, Japan, "The Grand Old Man of Japan," and on Dr. Masawo Kamo, of the Imperial University of Tokyo. The Holley Medal was bestowed upon Baron Chuzaburo Shiba.

The Council records with deep regret the death of Luther B. McMillan by airplane accident on August 10, 1929. Mr. McMillan had been a member of Council and the Executive Committee for over two years; previously he had served four years as member and one as Chairman of the Meetings and Program Committee.

The Council also records with sorrow the death of Worcester Reed Warner, sixteenth President of the A.S.M.E. and Honorary Member

MEMBERSHIP CHANGES—OCTOBER 1, 1928, TO SEPTEMBER 30, 1929

	Membership			Losses			Additions			Totals		
	Oct. 1, 1928	Oct. 1, 1929	Transferred from	Resigned	Dropped	Died	Transferred to	Elected	Reinstated	Loss	Gain	Net changes
Honorary Members	21	24				2	5			2	5	3+
Life Members	77	75				5	3			5	3	2—
Members	8550	8720	7	103	178	99	106	416	35	387	557	170+
Associates	644	634	4	11	25	4		31	3	44	34	10—
Associate-Members	4184	4178	88	68	206	18	62	289	23	380	374	6—
Juniors (20)	904	1172	42	39	102	2	447		6	185	453	268+
Juniors (10)	4368	4634	482	74	201	5		1016	12	762	1028	266+
	18748	19437	623	295	712	135	623	1752	79	1765	2454	689

of the Society. Mr. Warner died in Germany on June 25, 1929. Mr. Warner was one of the organization members of the Society. The Council has been advised that by his will $25,000 has been provided for the establishment of a Worcester Reed Warner Medal, emphasizing in this silent testimony the affection and interest Mr. Warner had in the A.S.M.E.

Marshal Ferdinand Foch, Honorary Member, died in Paris on March 20, 1929. In 1921, the A.S.M.E. jointly with the other Founder Societies, Civil, Mining, and Electrical, conferred Honorary Membership on Marshal Foch, as "an expression of appreciation of American engineers for the unmatched services of this master of engineering principles, cooperation and coordination."

REPORTS OF COMMITTEES

The report of the Council includes the following reports of the Standing Committees of the Council and the Boiler Code Committee.

Finance

The year 1928-1929 is another in the series of successful financial periods of the Society's existence.

The strong financial position of the Society has enabled it to carry on the development of The Engineering Index, which is now in its second phase, and has shown considerable advance in the year. The total investment in the Engineering Index is now $76,287.88, an increase of $12,495.80 over the investment at the end of the previous fiscal year. The fact that the deficit for 1928-1929 is about one-fifth of that for the previous year is an indication that the Index is progressing along the course originally forecast.

The excess of income over expenditures was $35,655.23 of which $5,000.00 was the Retirement Fund. The budget contained an item of $20,000.00 which was set up as a special item of reserve for Engineering Index Development. The total reserves were therefore increased by $55,655.23.

To finance the Society over the end of the fiscal year, $80,000.00 was borrowed. This is not an unusual occurrence, however, as Mechanical Catalog billings are made on the last day of the fiscal year while expenditures for the Catalog are incurred before that date. In 1927-1928, it was not necessary to borrow, as bonds worth $44,521.88 came due, in September, 1928, just before the close of the year and the cash was used to finance the Society. Re-investment was made during October, 1928.

The accompanying table giving the condensed comparison of balance sheets for the fiscal year ending September 30, 1929, with that of the previous year, reveals differences in all of the items. These differences are explained in the following paragraphs.

Cash. The reduction in the cash item is due primarily to the fact that while there were about $15,000.00 of accounts payable on September 29, 1928, on September 30, 1929, this item was zero.

Accounts Receivable. $4,000.00 of this increase is in unpaid dues. The rest of the increase is due to the increases in the billings for Mechanical Catalog, *Mechanical Engineering* and for the Index for September.

Inventory. Of the increase of $34,420.41, about $19,000.00 is in bound volumes of The Engineering Index, and the remainder is in publications for sales and miscellaneous supplies, largely raw paper stock for the publications.

Deferred Charges. The increase of $21,042.97 under this item is due to the additional loan of $12,495.80 to the Engineering Index and $9,557.66 additional loan to the Committee on the Properties of Steam. The item of office rearrangement has been paid up and the activities chargeable to the next year increased by an equal amount.

Investments for Trust Funds. The Hoover Medal Fund of $15,000.00 has been added. The remainder of the increase is primarily due to added interest.

Investment for Capital Account. Just before the close of the fiscal year in September, 1928, a block of bonds carried at $44,521.88 came due. The

cash was used to finance the Society over the close of the year and was reinvested immediately after the opening of the 1928-1929 fiscal year, hence the increase of about $45,000.00 in this item.

Fixed Assets. The increase of $1,164.17 is due to furniture bought during the year.

Current Liabilities. The change in this item is best shown by the following table:

	Sept. 29, 1928	Sept. 30, 1929
Notes Payable		$80,000 00
Liabilities for Unfilled Commitments	$41,860.60	51,507.51
Historical Bibliography (Hollis Gift)		320.60
Thurston Biography (Gleason Gift)	1,750.00	1,750.00
Accounts Payable	15,469.88	0.00
	$59,080.48	$133,578.11

The item of Notes Payable has been mentioned in a preceding paragraph. The increase in the item for Unfilled Commitments is due to increase in the cost of Mechanical Catalog and to items added just prior to the close of the fiscal year.

Trust Funds. This a balancing item previously explained.

Capital. The change in this item is explained by the following table:

	Sept. 29, 1928	Sept. 30, 1929
Fixed Assets	$513,509.63	$514,673.80
Reserve for Retirement Allowance	15,200.00	20,608.00
Appropriated for Investment	272,106.25	322,137.62
Reserve for Engineering Index Development		20,000.00
Working Capital	203,771.44	183,231.13
	$1,004,587.32	$1,060,650.55

CONDENSED COMPARISON OF BALANCE SHEETS

Assets

	Sept. 29, 1928	Sept. 30, 1929	Net Change During the Fiscal Year
Cash	$17,010.75	$4,367.49	— $12,643.26
Accounts Receivable	137,668.38	160,412.58	+ 22,744.20
Inventory	66,957.64	101,378.05	+ 34,420.41
Deferred Charges	86,899.09	107,942.06	+ 21,042.97
Investments for Trust Funds	115,810.11	134,315.85	+ 18,505.74
Investments for Capital Account	287,306.25	332,381.25	+ 45,075.00
Fixed Assets	513,509.63	514,673.80	+ 1,164.17
Total Assets	$1,225,161.85	$1,355,471.08	+$130,309.23

Liabilities

Current Liabilities	$59,080.48	$133,578.11	+ $74,497.63
Contributions for Research	32,859.53	22,453.48	— 10,406.05
Dues Paid in Advance	2,824.41	4,473.09	+ 1,648.68
Trust Funds	115,810.11	134,315.85	+ 18,505.74
Capital	1,004,587.32	1,060,650.55	+ 56,063.23
Set Aside for Expenditure during 1928-1929	10,000.00	0.00	— 10,000.00
Total Liabilities	$1,225,161.85	$1,355,471.08	+$130,309.23

Wm. J. Struss & Co., certified public accountants, give the results of their examination of the books of the Society for the fiscal year ended September 30, 1929, in the accompanying statement of assets and liabilities.

BALANCE SHEET OF SEPTEMBER 30, 1929

ASSETS

Cash		$3,007.38
Accounts Receivable:		
Members	$27,364.99	
Non-Members	133,047.59	
		160,412.58
Temporary Investments for Working Capital:		
Savings Banks		1,360.11
Inventories:		
Supplies	28,909.69	
Publications in Process	26,926.98	
Publications for Sales	45,541.38	
		101,378.05
Investments for Trust Funds (see contra):		
First Mortgage and Mortgage Bonds in Real Estate 5½%	58,000.00	
St. Louis, Peoria & N. W. R. R. 5%—1948	10,613.89	
New York Central & Hudson River R. R. 4%—1942	23,062.50	
Stock Shares (J. R. Freeman)	26,106.78	
Cash in Banks	11,532.68	
Savings Banks	5,000.00	
		134,315.85
Investments for Capital Account:		
First Mortgage and Mortgage Bonds on Real Estate 5½%	262,500.00	
Alabama Power Co. 5%—1951	5,000.00	
Texas Pwr. & Light Co. 5%—1956	4,850.00	
Dallas Pwr. & Light Co. 5%—1952	5,000.00	
San Diego Consolidated G. & E. 5%—1947	5,075.00	
Binghamton L. H. & P. 5%—1946	5,000.00	
Commonwealth Edison Co. 5%—1953	5,118.75	
Metropolitan Edison Co. 5%—1953	5,012.50	
Public Service Co. of Ill. 5%—1966	4,962.50	
Cumberland Pwr. & Lt. 4½%—1956	4,725.00	
Baltimore & Ohio R. R. 5%—2000	5,115.00	
Baltimore & Ohio R. R. 4½%—1933	4,947.50	
Alabama Power Co. 5%—1968	4,975.00	
Central Maine Power 5%—1955	10,100.00	
		332,381.25
Fixed Assets (Book value):		
Building	493,352.60	
Furniture and Equipment	21,319.20	
Library Books	1.00	
Engineering Index	1.00	
		514,673.80
Deferred Charges:		
Office rearrangement (paid in full)	.....	
Activities chargeable to next year	16,654.18	
Loan to Engineering Index Service (including furniture)	76,287.88	
Loan to Physical Properties of Steam	15,000.00	
		107,942.06
		$1,355,471.08

LIABILITIES

Notes Payable		$80,000.00
Unfilled Obligations		51,507.51
Gift for Thurston Biography		1,750.00
Historical Bibliography (Dr. Hollis)		320.60
Custodian Funds (33)		22,453.48
Dues Paid in Advance		4,473.09
Trust Funds (see contra):		
Life Membership	54,142.93	
Library Development	6,203.45	
Weeks Legacy	2,476.22	
Melville	1,683.48	
Charles T. Main	2,995.95	
Hunt Memorial	321.72	
Hess Awards—Junior and Student	2,005.00	
A.S.M.E. Research	611.63	
Westinghouse Bust	183.57	
Holley Medal	6,671.54	
Max Toltz	15,982.47	
John R. Freeman	26,037.89	
Herbert Hoover Medal	15,000.00	
		134,315.85
Capital Investments:		
In Fixed Assets	514,673.80	
Reserve for Retirement Allowance	20,608.00	
Appropriated for Investment	322,137.62	
Working Capital	183,231.13	
Reserve for Engineering Index Development Expense	20,000.00	
		1,060,650.55
		$1,355,471.08

In the following table the income and expenditures for the years 1927-1928 and 1928-1929 are compared.

CONDENSED STATEMENT OF INCOME AND EXPENDITURES

INCOME

	1927-1928	1928-1929
Initiation Fees	$29,772.32	$29,769.02
Membership Fees	293,847.95	303,272.09
Accounts Receivable (Members and Non-Members)	410,386.42	411,878.96
Interest	22,405.54	22,655.50
	$756,412.23	$767,575.57
Appropriated from 1927-1928 Excess Income		10,000.00
		$777,575.57

EXPENDITURES

Administration and General	$113,906.21	$119,068.38
Initiation Fees Account	21,592.01	25,595.37
Service to Members Account	263,899.43	282,086.38
Income Producing and Professional	275,820.42	271,032.63
Reserve for Engineering Index Development		20,000.00
Service to Public Account	23,079.07	24,659.42
	$698,297.14	$742,442.18
Preceding year's liability for Mechanical Catalog: Overexpended	+ 543.35	
Underexpended		— 521.84
	$698,840.49	$741,920.34
Balance of Income over Expenditures	$57,571.74	$35,655.23

Meetings and Program

The year 1928-1929 brought to fruition an ideal program of meetings of the Society. Five gatherings were held at well-distributed points, giving an opportunity for members of the Society throughout the country to participate in its meeting activities. These meetings were held at Boston, October 1-3, 1928, at New York, the Annual Meeting, December 3-7, 1928. Knoxville, March 21-23, 1929, Rochester, May 13-16, and at Salt Lake City, the Semi-Annual Meeting, July 1 to 4.

The material presented at these five meetings revealed a developing interest in many phases of mechanical engineering hitherto untouched by Society activities. The quality of papers throughout the meetings was uniformly good and in volume surpassed any other similar period in the Society's activities; 132 papers and 26 reports were given at 60 sessions. The total attendance was 3819.

There was an unprecedented volume of papers demanding a place on the last Annual Meeting program, as a result of which the Committee has joined with the Committee on Professional Divisions in facing the problem of providing a simplified Annual Meeting program and in diverting as much as possible of the technical material submitted to the appropriate Professional Division meeting.

Boston Meeting

The Boston meeting featured engineering problems of New England with special emphasis on power supply for the New England industries. A good group of technical sessions was held and the Boston Committee arranged interesting visits to the industries in the territory. The dinner provided a reunion for the older men who had been active in the work of the Society and gave the younger men an opportunity to become acquainted with them.

Annual Meeting

The 1928 Annual Meeting sessions started on Monday noon of the Meeting and continued through Friday noon. This, in some measure, reduced the intensity of the sessions. A public address system, installed in the auditorium, was used at this meeting and improved the sessions held in the auditorium to a considerable extent. The services of a public-speaking coach were used for the authors at this meeting, as was done at the previous Annual Meeting, and the results attained encouraged the Committee to proceed with this activity at subsequent annual meetings.

The features of the program were the presidential address of Alex Dow, the Thurston Lecture by Dr. Wheeler P. Davey, professor of physical chemistry, Pennsylvania State College, on "The Elastic Properties of Materials as shown by Crystal Structure Investigations," the joint session on illumination with the Illuminating Engineering Society, the presentation of the A.S.M.E. Medal to Dr. Julian Kennedy, and the presentation of Honorary Membership to our Past-Presidents Dean Mortimer E. Cooley and Dr. Ira N. Hollis. The registration of 2525 was 7 per cent greater than that for the 1927 meeting, thus setting a new record.

Knoxville Meeting

The engineers of the South cooperated heartily in the program and conduct of this meeting, which was made doubly interesting by the atten-

dance of a large number of students coming from as far as Florida and St. Louis. The technical program dealt primarily with engineering problems of the South. The feature address of the meeting was by Ralph E. Flanders on "Engineering and the Human Values." L. W. Wallace presented an interesting analysis of the roster of "Who's Who." At this meeting the Committee initiated the experiment of dispensing with the services of a stenographer to record the oral discussion, instructing the presiding officers to ask those who presented valuable oral discussion to submit their remarks in writing. This plan was carried through successfully at this meeting as well as at the Rochester and Salt Lake City meetings. Most of the oral discussions recorded previously by the stenographer were found to be of little value for permanent record, and under the new plan the receipt of material which is worthy of publication is believed to be reasonably assured.

Rochester Meeting

The Rochester meeting had a varied and interesting technical program at which a number of papers of special significance were presented. The chief speaker at the dinner was Dr. C. E. K. Mees, director of the research laboratory, Eastman Kodak Company, on "What Really Matters." On another evening during the meeting, Myron A. Lee gave an illustrated lecture on decoration and proportion in manufactured goods, Miss Kate Gleason, the first woman member of the Society, entertained the members and guests at a party at her home at which a supper in charge of the Food Administration Department of the Rochester Mechanics Institute was served, followed by entertainment and dancing.

Salt Lake City Meeting

The program of the Semi-Annual Meeting was made up of technical sessions, inspection trips, and social activities which were enjoyed by those in attendance. The inspection trips were attractive and included the Salt Lake Airport, and the copper mine at Bingham, Utah. Colonel Doty spoke at a luncheon on "The Engineer as a Community Asset," and short addresses were given at the banquet by George M. Bacon, president of the Engineering Council of Utah and State Engineer, and by W. L. Abbott, Past-President of our Society.

Fiftieth Anniversary

Plans for the Fiftieth Anniversary celebration next April are shaping up rapidly. This will be celebrated sequentially in three places, New York, Hoboken, and Washington. It is planned to visit the plant of the *American Machinist* in New York commemorating the preliminary meeting in the office of the *American Machinist* on February 16, 1880, and the program at Hoboken at Stevens Institute of Technology, where the organization meeting of the Society was held, will include a pageant for the delegates, members, and guests.

Approximately 550 invitations have been sent to the world's leading scientific and engineering societies as well as the world's leading educational institutions, to send two delegates each to the celebration. Arrangements are being made for the selection of an outstanding engineer from each of 16 countries to prepare a contribution on engineering development in his country during the past fifty years, these engineers to be made the recipients of a special Anniversary Medal and an honorarium.

The Committee takes great pleasure in acknowledging the splendid cooperation tendered by members of the Society, some in their capacities as officers of Local Sections and Professional Divisions, others as individuals who give unsparingly of their time and effort in the writing of papers and in helping with the meetings.

Publications

During the year ending September 30, 1929, the first volume of the Society's Transactions issued under the new plan of divisional publication was completed with a total of 259 papers. Sets of these, bound for permanent reference in the Society's depositories, comprise two volumes and include papers for the years 1927 and 1928. A number of complete sets have been offered for sale. The transactions of the Aeronautic Division are now issued under the name *Aeronautical Engineering,* appearing four times a year.

The Engineering Index Annual appeared also for the first time since the reorganization into the Engineering Index Service. The Annual was published in two volumes and contained 75,000 references on 5,000 subjects. In addition to the subject index, an author index was included for the first time. The entire list of references was carefully cross-indexed. The price of the Annual aroused criticism which was carefully considered by the Committee. The Committee hopes that further development of the Index will provide a basis for a reduction in the price of the Annual.

An advisory board of engineers representing various engineering societies and headed by the chairman of the United Engineering Societies Library Board was appointed to assist in the conduct and development of the Service. A growing number of subscribers in foreign countries is gratifying evidence of the value of the Index and the function it performs. Several technical committees of the Society have subscribed to the Service. A letter from S. T. Powell, chairman of the executive committee of the Joint Research Committee on Boiler Feedwater Studies, speaks appreciatively of the value to this committee of the references supplied to its subcommittee on bibliography.

The 1928 Record and Index was issued this year in cloth at a saving of $3000. There was included this year not only a very complete index to the Transactions, but also an index to *Mechanical Engineering,* and to the Codes and Standards published during the year, thus forming a complete index to the Society's technical publications and making the book a valuable and permanent reference source for every member.

Mechanical Engineering has appeared in two sections throughout the year, Part 2 being a single-sheet summary entitled: "What It's All About." Favorable comments have indicated the value of this summary.

The Condensed Catalogues were issued for the first time under the new name, Mechanical Catalog. The Catalog was sent this year only to those who requested a copy of it.

Through the generosity of John R. Freeman, past-president of the Society, a translation of "Hydraulic Laboratory Practice," originally published in German by the Verein deutscher Ingenieure, but containing much new material, was issued by the Society. The book contains 892 pages.

The papers on arc welding which received prizes and honorable mention in the Lincoln Arc Welding Prize Contest were published for the Society by the McGraw-Hill Book Company.

Under the auspices of the Aeronautic Division the Society published a "Dictionary of Aeronautical Terms" in abridged form, by J. Vanièr, of the staff of the Matériel Division of the Army Air Corps, Dayton, Ohio. The dictionary contains two sections, German-English-French and French-English-German.

The Biography Advisory Committee has under consideration several biographies of the Society's distinguished former presidents and honorary members. During the year Dr. W. F. Durand completed work on the biography of Robert Henry Thurston, first president of the Society. The biography was published in the fall of 1929.

Much thought has been given to publications commemorative of the Society's Fiftieth Anniversary to be celebrated in April, 1930. The Committee has received the enthusiastic interest and cooperation of Dr. Charles A. Beard in the preparation of a book which will be a symposium published by Longmans Green and Company under the title "Toward Civilization." The contributors to this symposium are eminent engineers and scientists, and they will attempt to answer from the point of view of the technologist the many indictments which have been leveled at the machine civilization of today by philosophers and humanists. With the assistance of the Professional Divisions, the Committee also has under way the preparation of a progress report covering fifty years of mechanical engineering.

Membership

The Committee on Membership held 21 meetings during the fiscal year 1928-1929.

The number of applications considered in the transaction of its work and a summary showing the action taken, follows:

Applications pending October 1, 1928	344
Applications received during fiscal year 1928-1929	2111
Total applications handled	2455
Recommended for membership	1968
Transfers Denied	8
Deferred	6
Withdrawn	16
Applications pending, October 1, 1929	457
Total	2455

Those recommended for membership were divided into the following grades:

Members	439
Transfers to Member	99
Associates	29
Associate-Members	336
Transfers to Associate-Member	59
Juniors	461
Juniors (R5 Rule 1)	545
Total Recommended	1968
Transfers	158
Total New Members Recommended	1810

During the fiscal year 1928-1929 the Membership Committee made the following recommendations which were reported and approved by the Council:

Elections declared void	306
Resignations accepted	306
Dropped from membership	701
Gross Loss	1062

Professional Divisions

The progress of the Professional Divisions for the last year has been marked with some very substantial accomplishments. Included in this report is a tabulation showing the technical papers secured by the Divisions for their National Meetings and for the general main meetings of the Society.

It is interesting to note that actual technical registration at some Divisional National Meetings exceeds or equals the registration at Semi-Annual Meetings of the Society.

National Meeting Activities

One of the major accomplishments of the year was in the field of aeronautics. The Aeronautic Division presented over 40 technical papers at its National Meeting in St. Louis in May. A gratifying part of the meeting was the splendid work done by the St. Louis Section, whose local committee spent a considerable sum of money in several very unusual and beneficial ways; $5000 was used to found "The Spirit of St. Louis Medal" to be awarded by the Society every three years for outstanding accomplishments in the aeronautic field. The first medal was presented to Daniel Guggenheim for his services to aeronautics. Another fund was used to honor twelve persons who had made substantial contributions to aeronautics since the transatlantic flight of Colonel Lindbergh; each one of the twelve was presented with a wrist watch. A member of the Local Committee founded a medal for model airplane flights.

A National Meeting which deserves special praise was the joint Materials Handling and Management Meeting in Detroit in May. This meeting was notable for the fact that the Local Committee acquainted with this field arranged the entire technical and social program. The technical program centered around methods of production in the automotive industries. It was a valuable and well-attended meeting.

Among other outstandingly successful national meetings were the Fuels Meeting held in Philadelphia, the Printing Industries Division Meeting at Rochester in November, 1928, and a remarkable one-day meeting held by them in New York in February which was especially well attended; on November 7 and 8, 1929, at Carnegie Institute of Technology, Pittsburgh, the Division also held a Conference on Research in Printing, which was endorsed by 22 printing organizations in this country.

Other valuable meetings were the Iron and Steel Meeting in Chicago, the Wood Industries Meeting in Grand Rapids, and the Oil and Gas Power Meeting held at State College, Pa., in June. The Textile Division held two joint meetings with the Textile Section of the National Safety Council. The Railroad Division held two joint sessions with the A.S.R.E.

Several of the Divisions consider that the Annual Meeting must be a national gathering place of their specialists. The Railroad Division both last year and this has sent out a special program to its members announcing not only its own sessions at the Annual Meeting but also sessions of other Divisions in which railroad men would be interested. The result has been a goodly increase in interest in their sessions.

An interesting development in September of this year was the holding of a National Meeting of the Iron and Steel Division simultaneously and in coordination with the national meeting of the American Steel Treaters and those cooperating groups, the American Welding Society, The Institute of Metals, and the Iron and Steel Division of the American Institute

PROFESSIONAL DIVISIONS ACTIVITIES IN 1929

	Aeronautics	Applied Mechanics	Fuels	Hydraulic	Iron and Steel	Machine Shop Practice	Management	Materials Handling	National Defense	Oil and Gas Power	Petroleum	Power	Printing Industries	Railroad	Textile	Wood Industries	Total 1929	Total 1928
1 Society Meetings (Semi-Annual, Regional, Annual)																		
(a) Number of sessions	2[1]	4	2	3	1	6	3	4	0	1	1	4	1	2	0	2	36	47
(b) Number of papers	4	8	4	6	2	13	5	11	0	3	1	6	7	5	0	6	81	97
2 National Division Meetings																		
(a) Number of meetings	2[2a]	0	1	0	2[2b]	1		1	1[6]	1	0	0	2[2c]	1		1	13	10
(b) Number of sessions	14	0	12	0	8	2	0[3]	5	0	5	0	0	6	[4]	[5]	4	57	42
(c) Number of papers and addresses	47	0	36	0	18	12	0	15	0	11	0	0	12	2		9	162	93
(d) Attendance—members	350	0	650	0	400	350	0	280	0	200	0	0	300			85	2615	1815
(e) Attendance—non-members	400	0	260	0	160	300	0	183	0	78	0	0	600			40	2021	1512
(f) Attendance—total	750	0	910	0	560	650	0	463	0	278	0	0	900			125	4636	3327
1 and 2																		
(a) Total Division sessions held	16	4	14	3	9	8	3	9	0	6	1	4	7	3	0	6	93	89
(b) Total Division papers presented	51	8	40	6	20	25	5	26	0	14	1	6	19	7	0	15	243	190
3 Research																		
(a) Survey Committee at work	0	0	1	1	0	0	0	1	0	1	1	0	1	1	1	0	8	9
(b) Executive Committee acting as Survey	1	1	0	0	1	1	1	0	1	0	0	1	0	0	0	1	8	6
(c) Projects being developed at present	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	4	11
(d) Special Research Committees authorized during year	1	0	0	0	1	0	1	0	0	2	0	0	0	0	0	0	5	11
4 Progress Reports	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	14	14
5 Enrollment in Divisions—1929	2300	3600	3768	2000	2750	4075	6325	2550	*	3050	1250	3942	350	1200	550	710	38,410	34,974
6 Enrollment in Divisions—1928	1990	3249	3422	1740	2129	3791	6032	2544	*	2805	1121	3606	241	1131	590	655		

[1] Includes only Rochester, Annual, and Salt Lake City Meetings.
[2] Two meetings; [2a] St. Louis, May, 1929, Cleveland, August, 1929; [2b] Chicago, Nov., 1928, Cleveland, Sept., 1929; [2c] Rochester, Nov., 1928, New York, Feb., 1929.
[3] Held joint meeting with Materials Handling Division at Detroit.
[4] Held two joint sessions with A.S.R.E.
[5] Held two joint meetings with Textile Section, National Safety Council.
[6] Held joint gathering with Army Ordnance Assn.
* All members are registered in National Defense Division.
NOTE: Table does not include any meetings held after October 2, 1929.

of Mining and Metallurgical Engineers. These meetings were held during Metal Week in Cleveland and brought together numbers of engineering groups primarily interested in the making and using of metals. The coordinated technical program of the week was very successful, since each group maintained its own individuality, arranging programs to avoid duplication.

Comparison of National Meetings

During the past year we have had several opportunities to gage the success of our Division meetings in comparison with the meetings held by small societies of about the same numerical strength and field. There is no doubt that these National Meetings of our Divisions are as well attended as the meetings of an equivalent independent society. As an illustration, our Oil and Gas Power Division recently held a National Meeting in cooperation with a college. A few days previously another society held its semi-annual meeting at the same college. The attendance at our Divisional meeting was 60 per cent larger, although of course the number of Division members is proportionally larger than that of our sister society. Both meetings were very well attended and successful.

Another illustration is the St. Louis National Aeronautic Meeting, showing a registration at its technical session of 395, excluding the banquet attendance; while the national meeting of another society in the aeronautic field had a registration of 267 for its technical sessions. This compares very favorably since the meetings of the latter society were held jointly with another body and at the time of the national airplane exposition.

1930 Meetings

There are at present eleven Divisional meetings in prospect for next year. Three of these are outstanding: A National Materials Handling and a National Management Meeting to be held in Chicago the week of March 3, at the time of a factory exposition, and in coordination with the National Management Congress; and a National Aeronautics Meeting to be held in Dayton, Ohio, May 19 to 21.

Other Activities

The Divisions have continued their work on the other three points of their program:

(1) They have contributed technical sessions to programs of the Annual, Semi-Annual, and other general meetings of the Society.

(2) The annual progress reports submitted by each Division last year aroused interesting comment.

(3) The surveys of the Divisions' fields for research projects were successful, and several new research committees were sponsored by the Society as a result of this work.

Among other activities that the Divisions are carrying on are: the securing of papers for international meetings, held this year in Japan and Paris, the "Elimination-of-Waste" by the Management Division, the Smoke-Abatement Work by the Fuels Division, and the splendid internal-organization work done by the Railroad Division which has not only organized committees to cover fully its activities but also has these committees functioning well.

The Standing Committee on Professional Divisions wishes to call attention again to the splendid work that has been done by committees of Local Sections by their cooperation in the holding of the National Division meetings.

Local Sections

The year 1928-1929 has contributed outstanding developments in the history of the Local Sections. The organization of the Youngstown Section was completed in time for it to be represented at the 1928 Annual Meeting. With headquarters at Youngstown, Ohio, its territory covers Columbiana, East Liverpool, East Palestine, Hubbard, Lowellville, Niles, Poland, Salem, Struthers, Warren, Wellsville, and Zanesville in Ohio, and Ellwood City, Greenville, Grove City, New Castle, and Sharon in Pennsylvania. This brings the total number of Local Sections to seventy. At the time of this report there is pending a petition for the establishment of a new section with headquarters at South Bend, Indiana. The territory of the Tri-Cities Section was enlarged to include the Iowa counties of Benton, Tama, Marshall, and Story. The Akron Section Territory was extended by the addition of the counties of Tuscarawas, Holmes, Ashland, Richland, Coshocton, and Carroll.

The outstanding accomplishment of the year is the provision made at the Rochester Meeting of the Council to extend the mid-west Local Section and Student Branch field service. In order to provide more efficient service to the Sections and Student Branches of the Mid-West, the Committee on Local Sections recommended a field assistant be added to the staff to serve jointly these two activities of the Society. Whereas the constantly widening scope of the Society's work has brought about a number of important additions to its staff during the past ten years, there has been little change in the personnel handling the Local Section and Student Branch activities

There are in the 16 mid-western states 26 Local Sections and 30 Student Branches of the Society. These are distributed as follows:

States	Sections	Student Branches
Indiana	1	2
Illinois	2	2
Iowa	1	2
Minnesota	2	1
Wisconsin	1	2
Michigan	2	2
Ohio	7	5
Northern Kentucky	1	2
Missouri	2	2
Arkansas	–	1
Oklahoma	1	2
Kansas	–	2
Nebraska	1	1
Tennessee	3	2
Louisiana	1	1
Alabama	1	1

At the outset it is recommended that the field assistant make his headquarters at Chicago, but later it may be desirable to transfer the mid-west headquarters to other cities, so that over a period of years members will get whatever added benefits may accrue to the headquarters city. Such a field man should add considerable impetus to the work of the Local Sections and of the Student Branches, since several Sections have called attention to the fact that Sections and Branches are seldom visited by the elected Officers of the Society.

During the year 1928-1929 were held 135 Section and 210 Student Branch meetings. The task of arranging these meetings produces an ever-growing

burden upon the officers of the Local Sections, and each year it becomes more difficult to persuade members in various communities that they can serve on administrative committees without seriously embarrassing their business obligations. It should here be emphasized that the field assistant is not expected to give a larger proportion of his services to the Chicago Section than to other Sections, although its central location and industrial prominence makes Chicago the logical place for mid-western headquarters.

It is also felt that the field assistant will benefit all branches of the Society's activities, such as publications, Professional Divisions, standardization, employment, etc., although the major effort will be to develop Local Section and Student Branch programs and activities. The office and work will be coordinated with the Chicago office of the Employment Service, under the supervision of the Committee on Local Sections.

The Council of the Society originates and outlines policies to the end that the maximum of service may be rendered to its membership and through the membership to the public. The vice-presidents and managers at present serve as contact men through whom the administrative office in New York keeps in touch with the membership on matters of policy. The secretary and assistant secretaries, through correspondence and personal contacts as far as time will permit, handle the vast details of the Society's activities.

The difficulty of getting men to serve on the Executive Committees of Local Sections has been referred to and the rather frequent change of personnel of these Committees in most instances does not tend to the unification of the Society's activities. Field representatives, through personal contact and example, would unquestionably inspire a more general interest on the part of the membership.

Public Relations

Licensing and Registration of Engineers. Another important question handled by the Local Sections Committee is the matter of licensing and registration of engineers.

Under the general heading of Public Relations, the Committee on Local Sections has for the past two or three years been developing this subject. Until the current year, however, it has been felt that ideas were not sufficiently crystallized to take any action. In view of the renewal of activity on the part of engineers in various states who believe thoroughly in registration, it was deemed wise at the Local Sections Delegates Conference in December, 1928, to appoint the following committee to make a canvas of the movement and report at the 1929 Conference:

James M. Todd, *Chairman,* New Orleans, La.
J. O. G. Gibbons, Newark, N. J.
J. M. Foster, N. C. State College of Agriculture and Engineering, Raleigh, N. C.
H. H. Bailey, Tennessee Electric Power Co., Chattanooga, Tenn.
T. F. Githens, Cleveland Twist Drill Co., Cleveland, Ohio.
Melvin Price, University of Florida, Gainesville, Fla.

Elimination of Waste. In cooperation with the Management Division, the Local Sections Committee as a matter of public relations encouraged the 70 Local Sections of the Society throughout the country to take aggressive action in encouraging the various industries operating within their territory to institute campaigns for elimination of waste in industry.

Fire Prevention through Standard Hose Couplings. Cooperating with the special Standardization Committee and the Chambers of Commerce, the Committee through the several Sections made a concerted effort to encourage the use of standard hose couplings in each of the large communities in Local Sections territory, so as to insure interchangeability of apparatus between the different districts of the larger municipalities.

Safety. The Local Sections Committee cooperated closely with the National Safety Council and arranged the appointment of a liaison "safety man" who would be available to assist the Local Sections executive committees in formulating programs on safety and the emphasis of safety.

Meetings

The Local Sections continue their cooperation with Professional Divisions and during the year National Divisional Meetings were held at

Baltimore (Aberdeen), National Defense, Oct. 4, 1928
Peninsula (Grand Rapids), Wood Industries, Nov. 26-27, 1928
Cleveland, Aeronautics, Aug. 31, 1929
Cleveland, Iron and Steel, Sept. 11-13, 1929
Cleveland, Machine Shop Practice, Sept. 30, Oct. 1, 1929
Detroit, Management and Materials Handling, May 1-3, 1929
Chicago, Power, Feb. 12-15, 1929
Central Pa. (State College), Oil and Gas Power, June 24-27, 1929
Metropolitan (New York), Printing Industries, Feb. 7, 1929
St. Louis, Aeronautics, May 27-30, 1929

Student Branches and Local Sections

A number of Local Sections were added to the group of those already taking a definite interest in the welfare of the Student Branches. Members of Student Branches were not only encouraged to attend meetings ot the Local Sections but a number of Sections arranged meetings for the purpose of bringing the membership of the Branches and Sections together Meetings of this type were arranged by the St. Louis Section with Washington University; Cleveland Section with the Case School of Applied Science; the Tri-Cities Section with the State University of Iowa; Boston Section with Northeastern University; Western Washington Section with the University of Washington; Louisville Section with the University of Louisville; Los Angeles Section with the California Institute of Technology; Kansas City Section with the University of Kansas; Metropolitan Section with its ten Student Branches; and Atlanta Section with the Georgia School of Technology.

The usual conferences of Local Sections Delegates were held at the 1928 Annual Meeting, at the Rochester Meeting on May 14, and at the Semi-Annual Meeting at Salt Lake City on July 2. At the Annual Meeting 67 delegates were present, 11 at Rochester, and 6 at Salt Lake City.

Society Development

The Committee on Local Sections functioning as the Committee on Society Development reports a considerable increase in income both from initiation fees and dues. The original budget for 1928-1929 was based upon an estimated income of $25,000 from initiation fees. The amount actually received was $29,769.02. $295,000 was estimated from dues, and the amount

MEMBERSHIP IN LOCAL SECTIONS, OCTOBER 1, 1929

Section	Membership 10/1/28	Membership 10/1/29	Increase	Per Cent	Meetings 10/28-29
Akron	116	139	23	20	7
Anthracite-Lehigh Valley	312	341	29	9	9
Atlanta [1]	111	110	— 1	— 1	8
Baltimore [1]	196	195	— 1	— 1	11
Birmingham [1]	116	109	— 7	— 6	8
Boston [1]	781	767	—14	— 2	7
Bridgeport	161	174	13	8	9
Buffalo	215	229	14	7	2
Central Pa.	104	118	14	14	1
Charlotte	45	46	1	2	1
Chattanooga [1]	27	26	— 1	— 4	2
Chicago	1074	1139	65	6	8
Cincinnati	295	330	35	12	6
Cleveland	406	421	15	4	10
Colorado	93	100	7	8	10
Columbus	80	83	3	4	6
Dayton	101	103	2	2	3
Detroit	493	534	41	8	9
Erie [1]	96	90	— 6	— 6	2
Florida [1]	85	68	—17	—20	3
Green Mountain	38	46	8	21	1
Greenville	32	33	1	3	3
Hartford	152	154	2	1	6
Houston	131	140	9	7	4
Indianapolis	137	141	4	3	8
Inland Empire	21	23	2	10	3
Kansas City	128	132	4	3	5
Knoxville	49	50	1	2	4
Los Angeles	426	428	2	1	10
Louisville	42	47	5	12	4
Memphis	27	27	—	—	1
Meriden [1]	37	35	— 2	5	5
Metropolitan	4960	5046	86	2	32
Mid-Continent	158	161	3	2	7
Milwaukee	276	292	16	6	11
Minneapolis	61	69	8	13	8
Nebraska	29	30	1	4	2
New Britain	51	53	2	4	9
New Haven [1]	163	147	—16	—10	8
New Orleans	89	89	—	—	6
North Texas	69	72	3	4	4
Ontario	133	143	10	8	6
Oregon	67	70	3	5	5
Peninsula	81	84	3	4	2
Philadelphia	1196	1274	78	7	9
Pittsburgh	563	580	17	3	2
Plainfield	304	314	10	3	8
Providence	195	199	4	2	5
Raleigh	27	31	4	15	5
Rock River Valley	71	74	3	4	6
Rochester	122	135	13	11	1
St. Louis	288	293	5	2	3
St. Paul	45	51	6	13	2
San Francisco	375	397	22	6	14
Savannah [1]	28	22	— 6	—21	3
Schenectady	201	205	4	2	8
Susquehanna [1]	68	62	— 6	— 9	1
Syracuse [1]	150	142	— 8	— 5	9
Toledo	82	86	4	5	9
Tri-Cities	52	79	27	52	7
Utah	41	44	3	7	5
Utica [1]	33	30	— 3	— 9	2
Virginia	130	143	13	10	2
Washington, D. C. [1]	198	181	—17	— 9	4
Waterbury	82	98	16	20	6
Western Mass.	144	156	12	8	3
Western Washington	111	116	5	5	8
West Virginia	47	54	7	15	0
Worcester [1]	200	194	— 6	— 3	7
Youngstown [2]	...	110	110	—	2
	17017	17704	687	4	407

[1] Loss in Membership; [2] New Section, Dec. 3, 1928.

91 per cent of Membership in Local Sections. Total Number of Student Branches 96.

LOCAL SECTIONS VISITED BY MEMBERS OF THE COMMITTEE ON LOCAL SECTIONS, 1928-1929

Section	Paul Doty, Chairman	T. L. Wilkinson	H. R. Westcott	C. W. Bennett	J. M. Todd	E. Hartford, Secretary
Anthracite Lehigh Valley	——	——	——	——	——	Oct. 1928
Atlanta	Mar. 1929	——	——	——	Mar. 1929	——
Baltimore	——	——	Mar. 1929	——	——	Mar. 1929
Bridgeport	——	——	——	——	——	Oct. 1928
Boston	Oct. 1928	——	Oct. 1928	——	——	——
Buffalo	——	——	——	——	——	Apr. 1929
Chicago	——	——	——	——	——	Apr.-June-Sept. 1929
Chattanooga	Mar. 1929	——	——	——	——	Mar. 1929
Cincinnati	——	——	——	——	——	Apr. 1929
Cleveland	——	——	——	——	——	Apr. 1929
Columbus	——	——	——	——	——	Feb. 1929
Dayton	——	——	——	——	——	Apr. 1929
Detroit	——	——	——	——	——	Feb. 1929
Hartford	——	——	——	——	——	May 1929
Knoxville	Mar. 1929	——	Mar. 1929	Mar. 1929	Mar. 1929	Mar. 1929
Louisville	——	——	——	——	——	Mar. 1929
Metropolitan	——	——	——	——	——	Permanent
Minneapolis	Permanent	——	——	——	——	——
New Orleans	——	——	——	——	Permanent	——
New Haven	——	——	Permanent	——	——	——
North Texas	——	——	——	——	Mar. 1929	——
Philadelphia	——	——	——	——	——	Apr. 1929
Pittsburgh	——	——	——	Permanent	——	Apr. 1929
Rochester	May 1929	May 1929	——	——	May 1929	May 1929
St. Louis	——	——	——	——	——	Apr. 1929
St. Paul	Permanent	——	——	——	——	——
Savannah	Mar. 1929	——	——	——	Mar. 1929	——
Susquehanna	——	——	Mar. 1929	——	——	Mar. 1929
Syracuse	——	——	——	——	——	Oct. 1928
Toledo	——	——	——	——	——	Feb. 1929
Tri-Cities	——	Permanent	——	——	——	Feb. 1929
Utah	July 1929	July 1929	July 1929	July 1929	July 1929	July 1929
Utica	——	——	——	——	——	Oct. 1928
West Virginia	——	——	——	——	——	Mar. 1929
Washington, D. C.	——	——	Mar. 1929	——	——	Mar. 1929
Youngstown	——	——	——	Jan. 1929	——	Feb. 1929

of dues received was $303,272.09. An increased income of $13,016.11 over the estimated income was returned to the Society through this activity.

The number of applications received in the fiscal year total 2111. This is the result of sending out approximately 54,000 letters and sets of literature, solicitation by members, personal requests, and cooperation of Local Sections or Professional Divisions.

The details of membership changes are given in the report of the Membership Committee and in the chart accompanying the general report of the Council.

The results of membership development are outlined in the accompanying tabulation, especially as applied to Local Sections programs.

Conclusion

As in the previous year, the Committee's efforts were more in the direction of increased efficiency in existing Local Sections rather than further extension of the number of sections. The Committee either individually or collectively visited 36 centers or over 50 per cent of all the Sections, as shown in detail in the accompanying table.

Constitution and By-Laws

The Committee on Constitution and By-Laws acts as a reviewing committee and advisor to the Council in preparing drafts or revisions of by-laws and rules to carry out policies that have been established by the Council.

The Committee considered this year the clarifying of the wording of R11, Rules 36 and 39 on Student Memberships; also the rewording of B3, Paragraph 1, Honorary Memberships, which left to the decision of the Council the number of honorary members.

On request the committee has reviewed certain stated procedures in the by-laws and rules, as a matter of information to Council or to assist in elimination of detail, if possible. No further action on these is to be reported at this time.

Awards

During the year the committee has held three meetings: in New York, on February 14, 1929, and on October 10, 1929, and at Princeton, N. J., on May 11, 1929.

The committee made its reports on Student Prizes and on the Junior Awards to the Council at the Akron, Ohio, meeting on October 21, 1929.

The Student Prizes are recommended for:

Frank Vernon Bistrom
William Wallace White

for their paper "An Investigation of a Rotary Pump."

The Junior Award is recommended to:

A. M. Wahl

for his paper "Stresses in Heavy Closely Coiled Helical Springs."

The committee makes no recommendation for the Charles T. Main Award this year because of the quality of the papers submitted. The committee plans, however, to endeavor to interest more students in the prize papers

for the next year on the subject, "The Value of the Safety Movement to the Industries."

At its February meeting a number of names for honorary membership to be submitted to the Council were agreed upon.

The committee has recommended that the Melville Award be made to

Prof. Joseph W. Roe

for his paper on the subject of "Principles of Jig and Fixture Practice."

At the May meeting it was agreed to make further suggestion of names of candidates for honorary membership.

The committee has recommended the Society Medal to

W. L. R. Emmet

for excellent work in electrical propulsion of vessels, and other matters in relation to power.

The committee has recommended the approval of the actions of the Committee on the "Spirit of St. Louis Medal."

It has also recommended improvement in the form of certificate for various awards and a sub-committee is acting on this.

The Max Toltz Fund is being administered in accordance with the deed of gift. So far this fall two loans have been granted and three loans are pending. On October 1, 1929, there was over $1,000.00 available for loans.

The committee has accepted the request from the Alfred Noble Memorial Prize Committee to select papers by our members for submission to the committee.

The committee has reported to the Council the bequest of $25,000.00 of our late Past-President Worcester R. Warner for the establishment of the Worcester Reed Warner Medal.

It has also recommended to the Council that all awards by other committees of the A.S.M.E. be reported first to the Committee on Awards for transmittal to the Council.

The committee has accepted the responsibility of conducting the ceremony of awards in connection with the Fiftieth Anniversary of the Society.

Relations with Colleges

New Branches. Three new Student Branches were established during the year at Vanderbilt University, Nashville, Tenn., University of Delaware, Newark, Del., and University of Southern California, Los Angeles, Calif. This makes a total of 96 Branches. The number of A.S.M.E. Branches in engineering colleges has increased from 72 in 1925-1926 to 96 at the end of the year 1928-1929 or 33 per cent in four years

Meetings Held. There were 618 meetings reported by the Branches this year, attended by approximately 30,619. This is an increase of 32 meetings over last year and an increase of about 9,000 in attendance, or 42 per cent.

There were 9 meetings in which both the Student Branch and the Local Section in the vicinity cooperated. Student Branch members received cash prizes from the following Local Sections: Atlanta, New Orleans, Philadelphia, San Francisco, Indianapolis, and Tri-Cities.

Debates. The Committee has encouraged debates between Student Branches and in cooperation with the Local Sections. Such debates have been held regularly every year for five years between Purdue University and Rose Polytechnic Institute, under the auspices of the Indianapolis Section.

Student Branch Conferences at Annual and Semi-Annual Meetings. Student Branch Conferences were held at the Annual and Semi-Annual Meetings, and a luncheon during the Annual Meeting at which both President Sperry and Past-President Dow spoke. During the Annual Meeting a half day was devoted to a special program for the benefit of the student delegates. At this session addresses were made by members of the A.S.M.E. and the response from the student delegates was most encouraging.

Special Publications. The Committee has issued a Monthly Student Branch Bulletin which is sent to each Honorary Chairman, Chairman, and Secretary of the Branches. In this bulletin are recorded news items of special interest to students and also special inspirational articles by members of the Committee.

The new "Manual for the Operation of a Student Branch" has been published and has proved of great benefit to the officers of the Branches in unifying the functioning of their organizations.

Six hundred and seventy subscriptions to *Mechanical Engineering* were received from Student Branches last year.

Visits to Branches. Visits were made by Mr. Libby, Mr. Hartford, Dean Prentice, Professor Church, Mr. Meyer, and Dean Potter to the following Student Branches: Case, University of Florida, Georgia Tech, George Washington University, Catholic University, Ohio State University, University of Tennessee, Drexel Institute, Johns Hopkins University, State University of Iowa, Iowa State College, Brooklyn Polytechnic Institute, New York University, College of the City of New York, Pratt Institute, Vanderbilt University, Virginia Polytechnic Institute, Ohio Northern University, and Armour. Professor Domonoske, Special Representative of the Committee on the West Coast, visited the California Institute of Technology, and Professor Daugherty visited the University of Oklahoma and the University of Texas.

Cooperation. This year has shown greater cooperation from the Branches than ever before. Ninety-two of the Branches have given us complete cooperation, as against the eighty-five of last year. Only one Branch, University of Porto Rico, has not responded to our efforts, while there were three inactive Branches last year. Also during the past year, cooperation has been developed between the Student Branches and the National Safety Council. Liaison representatives of the National Safety Council have been appointed for each Student Branch and many of the Branches have called on these men for aid in planning meetings on Safety.

Student Branches as Feeders to the A.S.M.E. Nearly six hundred of those who applied for Junior Membership in the A.S.M.E. were members of student branches the year before. This number has increased from 312 in 1920, or has nearly doubled in 9 years. During these 9 years, 4073 new members of the A.S.M.E. are traced to the influence of student branches. On the other hand the A.S.M.E. expended on the Committee on Relations with Colleges during these 9 years $36,812.00 or about $9.00 per new member secured, not counting the benefits to the profession through the contacts made by the A.S.M.E. with the thousands of students who were being prepared for the engineering profession.

Conclusions and Recommendations. The student branches of the A.S.M.E. are the life-blood of the Society. The new member of next year in one case out of three is a senior in the Student Branch this year. Of 1810 recommended for membership during the present year 600 or nearly 29 per cent were student members last year. In addition to this a considerable number of former Student Branch members waited one or more years before joining the A.S.M.E. Thus the Student Branches may be considered the main feeder for the A.S.M.E. Furthermore, the Committee on Rela-

tions with Colleges through visits to Student Branches has been helpful particularly to the smaller colleges in keeping the ideals of the A.S.M.E. before those who are preparing for entry to the engineering profession. The appropriation assigned to the Committee has been modest compared to the magnitude of the problem and the Committee urges that the Coun cil evaluate the importance of the Committee's work and provide a commensurate budget.

Education and Training for the Industries

The work of the Committee on Education and Training for the Industries is represented largely by the sessions held under its auspices. Following are the programs of these sessions during the period October 1, 1928–September 30, 1929.

New England Industries Meeting, Boston, October 1, 1928
Chairman: Howard Coonley, President, The Walworth Manufacturing Co., Boston, Mass.

"Apprentice System of Lynn Plant, General Electric Company," by Charles K. Tripp, Supervisor of Apprentices, General Electric Co., Lynn, Mass.

"Experience in the Selection of Apprentices with the Aid of Tests," by Walter S. Berry, Director of Training, The Scovill Manufacturing Co., Waterbury, Conn.

Annual Meeting, New York, December 4, 1928
Chairman: Dexter S. Kimball, Dean, College of Engineering, Cornell University, Ithaca, N. Y.

"Preliminary Findings of a Study of Intensive Types of Technical Education," by Robert H. Spahr, Society for the Promotion of Engineering Education, New York, N. Y.

Spring Meeting, Rochester, May 13, 1929
Chairman: John A. Randall, President, Mechanics Institute, Rochester, N. Y.

"The Technical Institute—European Examples and Their Significance for American Education," by W. E. Wickenden, Director of Investigation, Society for the Promotion of Engineering Education, New York, N. Y.
Discussion led by Chas. F. Scott, Professor of Electrical Engineering, Sheffield Scientific School, Yale University, New Haven, Conn., and John T. Faig, President, Ohio Mechanics Institute, Cincinnati, Ohio.
"Industry Specifies its School Training Needs," by Virgil M. Palmer, Superintendent of Industrial Economy, Eastman Kodak Company, Rochester, N. Y.
Discussion led by C. S. Coler, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., E. A. Crockett, Manager of Industrial Management Council, Chamber of Commerce, Rochester, N. Y., and B. O. Synder, Educational Director, North East Electric Company, Rochester, N. Y.
"The British Apprenticeship Report and Its Value to American Industry," by Wm. S. Conant, Consulting Engineer, Washington, D. C.

In addition, a session was held in Akron as part of the Regional Meeting, on October 21, 1929. Following is the program.

Chairman: F. E. Ayer, Dean, College of Engineering and Commerce, University of Akron, Akron, Ohio.

"Apprenticeship in the Rubber Industry," by C. C. Slusser, Vice-President, Goodyear Tire and Rubber Co., Akron, Ohio.

Discussion led by W. R. Murphy, Superintendent of Labor, Firestone Tire and Rubber Co., Akron, Ohio, H. E. Cook, Assistant Superintendent of Engineering, The B. F. Goodrich Rubber Co., Akron, Ohio, and Professor John Adendorff, University of Akron, Akron, Ohio.

The program for the session at the Annual Meeting, to be held in New York in December, 1929, is as follows:

Chairman: Gen. R. I. Rees, President, Society for the Promotion of Engineering Education, New York, N. Y.

"Report on the Study of Non-college Technical Education," by Wm. E. Wickenden, Director of Investigation, Society for the Promotion of Engineering Education, New York, N. Y.

Discussion by James A. Moyer, State Director of University Extension, Boston, Mass.

"Suggestions for Encouraging Education and Training for Industry," by Harold S. Falk, Vice-President and Works Manager, The Falk Corporation, Milwaukee, Wis.

The paper by Mr. Falk has already been printed, and sent, with an appropriate letter, to the secretaries of all the A.S.M.E. Sections in the country. Many of the delegates from these Sections will attend the December, 1929, session to hear Mr. Falk's paper, and it is hoped that education and training for the industries will be stimulated in many parts of the country by the inauguration of contests similar to those suggested in his paper.

For the Semi-Annual Meeting at Detroit in 1930 it is proposed to have a symposium of papers on automotive education.

Committee meetings were held in New York in December, and in Rochester in May. There is always an active internal correspondence going on within the committee, all members of which are interested and active.

During the past year The American Society of Mechanical Engineers has had the distinguished honor of having released at its sessions the reports of the study of technical institutes made during the past year and a half under the supervision of Dr. Wm. E. Wickenden, from funds supplied largely by the Carnegie Foundation. These reports, the last of which will be presented at the Annual Meeting in December, 1929, are the most authoritative that exist in the field of education covered by the study.

Library Committee

The Library Committee represents the A.S.M.E. on the joint board of the Engineering Societies Library. At the end of each calendar year the library publishes a report. This report describes the work of the Library and its many activities for the benefit of its users. To give further detail would be a duplication. The Secretary will be glad to send a copy of this report to any member on request.

Some interesting items that will show in this report will be the number of persons using the library—well into the tens of thousands—and members and non-members assisted by correspondence or by loans of books.

The budget for 1929 was $47,660, and is appropriated by the Founder Societies on a *pro rata* basis of the membership in the societies. It is felt that this method allocates expenses more equitably according to the use of the library.

Research

The year closed with the Society as sponsor for 27 cooperative research projects covering the most important specialized fields of mechanical engineering. Special research committees including in their memberships engineering executives and technical experts are actively at work now on practically all of these projects. The personnel of the committees totals 340, 41 per cent of whom are non-members of the Society. In each Professional Division of the Society there is also a Survey Committee continually on the watch for problems in its particular field which may be suitable for attack by Special Research Committees. The extent of the activity of the Special Research Committees may be judged from the fact that during the last Annual Meeting and the coming one some half dozen technical sessions have been assigned to them by the Meetings Committee for the presentation of progress reports and of related papers from non-committee members. All the research work of the Society is supervised, of course, by the Standing Committee of the Council on Research which meets regularly four times a year to administer these activitis.

The experimental programs of the research committees are receiving continued and growing financial support from industry and research financing agencies such as Engineering Foundation, the National Advisory Committee for Aeronautics, etc. This support is supplemented by the very considerable assistance rendered through the research facilities contributed by the Government, university laboratories, and the laboratories of industrial firms.

International Cooperation

In accord with the spirit of the times, international contact and cooperation on research problems is being accomplished in growing measure by the Society's research committees.

In July, 1929, five American experts associated with the work of the A.S.M.E. Special Research Committee on the Physical Properties of Steam, met in London with similar groups from Great Britain, Germany, and Czechoslovakia and agreed upon a network of fixed or test values of the properties of water and steam which will form the basis for their several national steam tables. A program was also evolved whereby the results of their separate and continuing experimental studies will be applied to the periodical revision of this network of values or points until all of the steam tables published in the various industrial countries will agree at all essential points.

A committee organized last year under the auspices of the Verein Deutscher Ingenieure in Germany to study fluid flow in cooperation with the A.S.M.E. Committee on Fluid Meters is actively at work.

Close contact and cordial relations exist with the respective research staffs of the Department of Scientific and Industrial Research, The Institution of Mechanical Engineers, and the National Physical Laboratory in Great Britain and the Verein Deutscher Ingenieure in Germany.

Publication of Research Results

The Society's membership and industry in general receive the principal returns from their investment in the research committee activity through the reports and papers which appear from time to time in *Mechanical Engineering*, Sections of the A.S.M.E. Transactions, other technical publications, and the A.S.M.E. Research Publications in the form of

bibliographies and monographs on special subjects. Current progress is reported regularly in the bi-monthly issues of the *A.S.M.E. News* and in the technical and daily press.

Believing that a collection of the committee reports and related papers, now scattered through the year's issues of the Society's publications, will be useful in bound form to a considerable number of the membership and others, the A.S.M.E. Research Committee is preparing such a volume for issue at the time of the 1929 Annual Meeting of the Society. This volume will contain some 300 pages and will cover the period, October 1, 1928–October 1, 1929.

The series of A.S.M.E. Research Publications, now five in number, will be augmented this coming year by monographs and bibliographies, prepared by experts, on Stress Analysis of Pressure Vessel Heads, Riveted Joints, Wire Rope, Cutting of Metals, and Boiler Feedwater Studies. A second edition of the booklet, "A.S.M.E. Research Activities," outlining the organization, scope, and accomplishments of the Society's research activities, is now in preparation.

Committee Progress

A brief review of progress by the various Special and Joint Research Committees follows:

Lubrication. Mayo D. Hersey, chairman. Organized October, 1915. The close of the year finds this committee embarking on an enlarged research program, both bibliographical and experimental, calling for the expenditure of over $20,000 during a period of two years. Part of the program will consist in the collection of important foreign and domestic literature on the subject while the present group of closely coordinated investigations will be continued and enlarged. They cover the characteristics of an effective lubricant, design of bearing surfaces and mountings, and the phenomenon of oiliness. Most of the experimental work will be carried on at the Bureau of Standards and funds are now being solicited from industry to support this program. Engineering Foundation has continued to show its confidence in this committee by again contributing $500 for clerical assistance.

Other investigations in progress at present in which the Committee is cooperating are (1) an experimental test of the hydrodynamic theory of lubrication at the Pennsylvania State College; (2) experiments on pressure distribution in oil films at the Kingsbury Machine Works, and (3) experiments on waste-packed bearings, ring oiling and forced lubrication in the Research Department of the Westinghouse Electric & Manufacturing Co.

The Committee held a regular technical session during the December, 1928, Annual Meeting of the Society and will hold another during the coming Annual Meeting. Reports and papers published during the past year are: "Journal Running Positions," by H. A. S. Howarth, Applied Mechanics Section of Transactions, January–April 1929; and "Friction of Journal Bearings as Influenced by Clearance and Length," by S. A. McKee and T. R. McKee, Applied Mechanics Section of Transactions, May–August, 1929.

Fluid Meters. R. J. S. Pigott, chairman. Organized 1916 and reorganized July, 1926. On the invitation of the Japanese World Engineering Conference the committee is sponsoring a paper by Ed S. Smith, Jr., one of its members, entitled, "Quantity Rate Fluid Meters" which will be read at the Conference.

The revision of Part 1 of the Fluid Meters Report originally published in November, 1924, and the preparation of Parts 2 and 3 on Description of Meters and Influence of Installation, respectively, has gone forward during the year. The demand for Part 1 has run into 3,000 copies and a third edition will be published about the first of the calendar year after the present revision is completed.

A regular technical session was held by the Committee at the last Annual Meeting of the Society. A similar session will be held at the coming meeting in December, 1929, in the form of a symposium on the application of geometrical similarity and dimensional analysis in fluid flow.

Close contact has been maintained throughout the year with the German Committee organized in July, 1928, under the auspices of the Verein Deutscher Ingenieure to cooperate with the A.S.M.E. Committee in the experimental study of certain phases of fluid-flow measurement.

The publications of this Committee during 1928-1929 are: "The Laws of Similarity for Orifice and Nozzle Flows," by John L. Hodgson, Fuels and Steam Power Section of Transactions, September–December, 1929; "Orifice-Steam-Meter Coefficients," by Robert W. Angus, Fuels and Steam Power Section of Transactions, May–August, 1929; and "Progress Reports of Subcommittees Nos. 1, 2, 4, and 7 of the Special Research Committee on Fluid Meters, presented at the 1928 Session on Fluid Meters.

Physical Properties of Steam, Alex Dow, chairman. Organized December, 1921, and reorganized April, 1929. Early in the year this committee was reorganized and enlarged in order to more effectively carry forward its program. The new committee now includes the best known steam experts in the country as well as prominent industrialists interested in the preparation of accurate steam tables. A comprehensive five-year program of further research at the Bureau of Standards and the Massachusetts Institute of Technology to cost $100,000 has been formulated and due to the efforts of Chairman Dow a large part of the necessary funds has already been pledged by industry. To date approximately $80,000 has been spent by the Committee in experimental work at Harvard University, Massachusetts Institute of Technology, and the Bureau of Standards. In order that existing data may be available for general use the Society has arranged to publish a tentative steam table based on calculations made by J. H. Keenan, a member of the Committee.

During the past summer five American experts associated with the work of the Committee attended an international steam-table conference in London which was highly successful both in the agreements reached and the cordial relationships established among the steam-table experts attending from Great Britain, Germany, Czechoslovakia, and the United States. A network of fixed or test values of the properties of water and steam was agreed upon, which will form the basis for their several national steam tables. A program was also evolved whereby the results of their separate and continuing experimental studies will be applied to the periodical revision of this network of values or points until all of the steam tables published in the various industrial countries will agree at all essential points.

During the 1928 Annual Meeting of the Society the Committee held its regular open session for discussion of progress reports. A similar session will be held this December.

The publications of this Committee during 1928-1929 are: "Progress in Steam Research," reports of work at the Bureau of Standards, Massachusetts Institute of Technology, and in Czechoslovakia, *Mechanical Engineering,* February, 1929; "Revised Mollier Chart for Steam, Extended to the Critical Point," by J. H. Keenan, *Mechanical Engineering,* February,

1929; and "A General Steam Equation," by R. C. H. Heck, *Mechanical Engineering,* February, 1929.

Strength of Gear Teeth. Wilfred Lewis, chairman. Organized December, 1921. Prof. Earle Buckingham, as director of the Committee's experimental program at Massachusetts Institute of Technology, has continued an extensive series of tests on the Lewis gear testing machine on the effect of tooth accuracy on the strength of gear teeth at varying velocities. The tests of the past year have been designed primarily to prove the validity of a method of mathematical analysis previously developed. Special attention has been given also to a study of non-metallic gears. The Committee is now preparing a report summarizing the results of the experimental work during the past two years.

The publications of this Committee during 1928-1929 are: "Tests on Non-Metallic Gears." Progress Report No. 13, "*Mechanical Engineering,*" December, 1928; and "Limit-Wear-Load Tests," Progress Report No. 14, *Mechanical Engineering,* July, 1929.

Cutting of Metals. W. W. Nichols, chairman. Organized September, 1923. The Committee's work during the past year has been prosecuted along several lines. Prof. O. W. Boston, Secretary of the Committee, has contributed during the year a bibliography on the cutting of metals which is now being prepared for publication by the Society. This activity is part of the Committee's program of correlating existing data on this subject.

Considerable progress has been made in the collection and correlation of data on the relation of performance characteristics of cutting fluids to their physical and chemical characteristics. This study has as its aim the establishment of a basis for purchase specifications. A two-year program to cost $10,000 is contemplated for this part of the research.

A Subcommittee on Machinability of Metals is closely following the development of cemented tungsten-carbide-cutting tools, being concerned particularly with their possible effect on machine-tool design.

Another Subcommittee has prepared a tentative test code for high-speed tool steel which will be presented for discussion at the coming Annual Meeting.

The publications of this Committee during 1928-1929 are: "Cooling and Lubrication of Cutting Tools," Progress Report No. 1 of Subcommittee on Cutting Fluids, Machine Shop Practice Section of Transactions, May–August, 1929; and "The Present Status of Tungsten Carbide as a Cutting Material," Report of Subcommittee on Machinability, *Mechanical Engineering,* September, 1929.

Mechanical Springs. Joseph Kaye Wood, Chairman. Organized May, 1924. The Committee's experimental work during the past year has been carried on chiefly at Union College under the direction of Prof. M. F. Sayre. Elasticity of spring materials has been the subject of this study.

In April, 1929, Mr. Wood made a trip to important industrial cities in the East to organize the Committee's financial campaign and arrange for the cooperation of certain research laboratories in its experimental program. As a result a study of fatigue tests on helical springs is now in progress at the U. S. Naval Experimental Station under the direction of Dr. D. J. McAdam. The research laboratory at the Westinghouse Electric & Manufacturing Co. and that of Prof. J. B. Reynolds at Lehigh University are also cooperating in studies of large type helical springs and conical springs, respectively.

The publications of the Committee during 1928-1929 are: "Progress Report No. 4 on Mechanical Springs," Applied Mechanics Section of Transactions, September–December, 1929; "Tests on Belleville Springs by the Ordnance Department of the U. S. Army," by D. A. Gurney, Applied

Mechanics Section of Transactions, January–April, 1929; "Stresses in Heavy Closely Coiled Helical Springs Axially Loaded," by A. M. Wahl, Applied Mechanics Section of Transactions, May–August, 1929; "Fatigue and Corrosion-Fatigue of Spring Material," by D. J. McAdam, Applied Mechanics Section of Transactions, January–April, 1929; "Telephone-Apparatus Springs," by J. R. Townsend, Applied Mechanics Section of Transactions, January–April, 1929; "A New Type of Air Spring," by J. K. Wood, presented at the A.S.M.E. Spring Meeting, Rochester, N. Y., May, 1929.

Effect of Temperature on Properties of Metals. H. J. French, chairman. Organized January, 1925. At its meeting in June, 1929, Messrs. G. W. Saathoff and F. M. Van Deventer resigned as chairman and secretary, respectively. Their service to the Committee since its organization has been of great value and highly appreciated.

C. E. MacQuigg headed up the Committee till its September meeting when Messrs. H. J. French and N. L. Mochel were elected chairman and secretary, respectively. The administrative subcommittees have been reorganized to more effectively push forward the collection of data on the effect of high and low temperatures on metals from industrial laboratories cooperating in the Committee's program. Several individuals interested in the Committee's work have been appointed associate members.

A program of fatigue tests of metals at high temperatures has been carried on during the year for the Committee by Prof. H. F. Moore at the University of Illinois.

The publication of this Committee during 1928-1929 is: "A Machine for Making Creep Tests at High Temperatures," by Glen D. Bagley, Fuels and Steam Power Section of Transactions, September–December, 1929.

Condenser Tubes. Prof. A. E. White, chairman. Organized June, 1925. A special study is being made of the effect of condenser design and operating conditions on tube deterioration. Several central stations are cooperating in the field tests. During the year a paper on the "Effect of Design and Operating Conditions on Condenser Tube Deterioration," Progress Report No. 2, was published in the June, 1929, issue of *Mechanical Engineering.*

Boiler Feedwater Studies. S. T. Powell, chairman. Organized May, 1925, as a joint committee with the A.B.M.A. A.R.E.A., A.W.W.A., N.E.L.A., A.S.T.M. and A.S.M.E.

The Committee has continued its efforts to give wide publicity to boiler feedwater problems and progress in their solution. Technical sessions were held during the 1928 Annual Meeting and at the Rochester Meeting in May, 1929. Papers have also been contributed to meetings of other technical societies. Abstracts of the technical literature of the world pertaining to the subject have been regularly supplied the Committee by *Chemical Abstracts* and the Engineering Index Service and they have been distributed to the technical press for publication.

The Committee's financial campaign for support of its proposed five-year $300,000 investigational program has been actively pushed and is nearing completion.

Arrangements have been completed already with Prof. C. W. Foulk at the Ohio State University to begin an experimental study of priming and foaming in boiler feedwater.

The publications of the Committee during 1928-1929 are: "Progress Report on Boiler Feedwater Studies," Fuels and Steam Power Section of Transactions, May–August, 1929; "The Formation and Thermal Effects of Calcium Sulphate Boiler Scale," by E. P. Partridge, Fuels and Steam Power Section of Transactions, September–December, 1929; "Control of

Boiler-Water Treatment to Prevent Embrittlement," by F. G. Straub, *Mechanical Engineering*, May, 1929; and papers contributed at meetings of other societies.

Boiler Furnace Refractories. C. F. Hirshfeld, chairman. Organized May, 1925. The U. S. Bureau of Mines reports that the Bulletin to be issued summarizing results of the field investigations made for the Committee on factors governing the failure of refractories in various types of installations is nearing completion.

Extensive slag tests on refractory brick have been prosecuted during the year at the University of Illinois and the Ceramic Station of the Bureau of Standards. Results to date indicate that a satisfactory laboratory slagging test can be developed that will predict the service value of refractories. Considerable success has accompanied the Committee's study of refractory corrosion by slag quenching tests.

The publications of the Committee during 1928-1929 are: "Refractories Service Conditions in Furnaces Burning Anthracite on Travel-Grate Stokers," by Messrs R. A. Sherman, Edmund Taylor, and H. S. Karch, Progress Report of Committee, Fuels and Steam Power Section of Transactions, May–August, 1929; "Refractories Service Conditions in Furnaces Burning Fuel Oil," by Messrs R. A. Sherman, Edmund Taylor, and H. S. Karch, Progress Report of Committee, Fuels and Steam Power Section of Transactions, September–December, 1929; "A Laboratory Slagging Test for Boiler Furnace Refractories," by R. K. Hursh, Fuels and Steam Power Section of Transactions, September–December, 1929; "Proprietary Air-Cooled Refractory Walls," by Charles S. Gladden, Fuels and Steam Power Section of Transactions, September–December, 1929; "A Study of Crystalline Compounds Formed in Slags on Boiler Furnace Refractories," by T. A. Klinefelter and E. P. Rexford, Fuels and Steam Power Section of Transactions, September–December, 1929; "Study of Some Factors in Removal of Ash as Molten Slag from Powdered Coal Furnaces," by R. A. Sherman, Fuels and Steam Power Section of Transactions, September–December, 1929; "Evolution of the Slag-Tap Furnace at the Charles R. Huntley Station of the Buffalo General Electric Company," by H. M. Cushing, Fuels and Steam Power Section of Transactions, September–December, 1929; "Present Status of Tests for Refractories," by S. M. Phelps, Fuels and Steam Power Section of Transactions, September–December, 1929; and "Boiler Furnace Refractories," by C. F. Hirshfeld and W. A Carter, Fuels and Steam Power Section of Transactions, September–December, 1928.

Elevator Safeties. M. H. Christopherson, chairman. Organized June, 1924. A large number of tests have been conducted during the year on various types of elevator buffers in the Committee's elaborate testing installation set up at the Bureau of Standards, Washington, the data from which will be used by industry in further developing this apparatus. The results of these tests, as well as of those contemplated on other elevator safety devices, will be used as a guide in revising certain rules in the present American Standard Safety Code for Elevators.

Approximately $45,000 has been spent to date on this investigation. Meetings of the Committee have been held approximately every two months during the year to review the progress of the experimental work and to interpret the Safety Code to inquirers.

Worm Gears. Prof. Earle Buckingham, chairman. Organized May, 1927. About the beginning of the year the Committee completed and published the results of an analysis, by its worm-contact method, of a large amount of service and test data on the efficiencies, load-carrying abilities, and lubrication conditions of worm drives which had been collected from

manufacturers and users of these drives. This study has also enabled Chairman Buckingham to amplify his previous work on equations necessary to determine the thread form of milled and ground threads in various sections. The members of the Committee, as well as others interested in its efforts to improve the design and use of worm drives, are now carrying on tests carefully designed by the Committee to reveal further information on the action of worm drives.

The publications of the Committee during 1928-1929 are: "Worm Gears—A Study and Review of Existing Data," Progress Report No. 2 of the Committee, Machine Shop Practice Section of Transactions, May–August, 1929; "Thread Forms of Milled Worms," Progress Report No. 3 of the Committee, Machine Shop Practice Section of Transactions, May–August, 1929; "Worm Gears—A Study of Service Data," Progress Report No. 4 of the Committee, Machine Shop Practice Section of Transactions, May–August, 1929.

Welding of Unfired Pressure Vessels. E. H. Ewertz, chairman. Organized December, 1926, as a joint committee with the American Welding Society.

It has been decided to suspend temporarily the Committee's proposed test program for two reasons, namely, lack of financial support from the pressure vessel manufacturing industry and the fact that the A.S.M.E. Boiler Code Committee is about to promulgate a code of recommended welding procedure for pressure vessels. It seems probable that tests will be necessary, as the result of the expected comment, to prove the practicability of the new procedure. The Committee has offered its services to the Boiler Code Committee in a consulting capacity.

Spark Arresters. Authorized September, 1926. No committee. The Main Research Committee has distributed approximately 2,000 copies of the paper by A. C. Coonradt, "Steam Generating Apparatus in Forest Areas as Related to Causes of Forest Fires," which summarizes the results of surveys financed by the Committee and made under the direction of A.S.M.E. Local Sections in the three great logging areas of the country. The paper has been discussed at meetings of the Pacific Logging Congress, the Society of American Foresters, and the Mechanical Division of the American Railway Association as well as the A.S.M.E. Wood Industries Division. A joint study of certain mechanical engineering aspects of forest-fire prevention has been proposed and a program is now being developed.

Saws and Knives. C. M. Bigelow, chairman. Organized October, 1927. The Committee's first progress report presented in October, 1928, revealed the need for research to improve the use and design of woodworking tools and pointed out the value that would accrue to both manufacturers and users through engineering standarization. A later paper by Ira W. Dye, member of the Committee, served to emphasize the need, particularly in the primary conversion field.

The wide publicity given these reports by the Committee has attracted considerable interest and support to the Committee's program among both manufacturers of tools and the wood conversion and using industries. It is planned to employ a research engineer to collect data and make field tests that will reveal the best tools for various jobs and indicate where improvements in both manufacture and application may be made. The result of this study should reveal a basis for standardization. The Engineering Foundation, as well as a prominent wood tool manufacturer, have already promised a substantial contribution toward financing this program.

The publications of this Committee during 1928-1929 are: "Reducing Waste by Improvement of Design and Use of Woodworking Saws and Knives," Progress Report No. 1 of the Committee, Wood Industries Section of Transactions, September–December, 1928; and "Progress and Problems Relating to the Use of Saws in the Primary Wood Industries of the Pacific Northwest," Report to the A.S.M.E. Special Research Committee on Saws and Knives by Ira W. Dye, Seattle, Wash., Wood Industries Section of Transactions, May–August, 1929.

Existing Supplies of Hardwoods. Organized October, 1927. Little activity can be reported for this Committee during the past year. The Director of the Forestry Service of British Guiana has been paid a small sum to collect samples of representative hardwoods for shipment to this country and arrangements have been made with the University of Michigan to conduct tests to determine the applicability of such tropical woods to the uses of American wood-working industries.

Strength of Vessels under External Pressure. W. D. Halsey, chairman. Organized June, 1929. This Committee, which is representative of both manufacturers and users, is attempting to develop reliable design data for vessels subjected to external pressure. A review is now being made of available design formulas and performance records on this type of vessel in order to determine where further study is needed.

Absorption of Radiant Heat in Boiler Furnaces. Prof. W. J. Wohlenberg, chairman. Organized April, 1928. The Committee has continued its work of correlating and analyzing existing practical information from central stations on the transfer of radiant heat in boiler furnaces. Contact has been established with a Subcommittee of the National Research Council's Heat Transmission Committee studying the fundamentals of radiation.

Fuels. F. R. Wadleigh, chairman. Organized October, 1927. A careful review of fuels research going on throughout the world has convinced the Committee that there are many problems pressing for solution. The Committee is tentatively considering a study of sampling pulverized coal, a problem which particularly lends itself to cooperative attack.

Velocity Measurement of Fluid Flow. Dr. W. F. Durand, chairman. Organized September, 1927. Professors H. E. Hartig and H. B. Wilcox are conducting experimental work at the University of Minnesota on the measurement of fluid velocities by means of the location of nodal points in wave systems. Results obtained to date encourage them to believe that this method of measurement is an entirely practicable one. The Engineering Foundation is financing this project.

Physical Constants of Refrigerants. Joint sponsorship with the American Society of Refrigerating Engineers for a research leading to the determination of the physical constants of certain refrigerants was authorized in October, 1927. The cooperation of several other technical societies has been obtained for the purpose of making a joint appeal to Congress for support of a $50,000 a year research program at the U. S. Bureau of Standards.

Management Formulas. W. E. Freeland, chairman. Organized March, 1928. Little progress can be reported during the past year on the Committee's program of reconciling certain economic laws affecting production and developing formulas for general adoption.

Diesel Fuel Oil Specifications. H. C. Dinger, chairman. Organized September, 1928. After carefully studying the conditions affecting possibilities of establishing practical specifications for diesel fuel oils, the Com-

mittee prepared and circulated to oil producers, engine manufacturers, and users throughout the world tentative specifications for heavy and light engines. On the basis of the replies received, the model specifications were revised and tests are now being conducted in the field to prove their practicability.

During the year the Committee came to the conclusion that the establishment of workable and economical specifications is possible and it accordingly arranged to cooperate with the Subcommittee on Fuel Oils of the A.S.T.M. Committee D-2 on Petroleum Products. A move toward the development of American Standards for these oils has also been begun under the procedure of the American Standards Association.

This Committee's contribution to the A.S.M.E. publications during 1928-1929 is: "Diesel Fuel Oil Specifications," Progress Report No. 1 of the Committee, *Mechanical Engineering*, October, 1929.

Wire Rope. Authorized by Council October, 1928. In developing this project the A.S.M.E. Research Committee has made an exhaustive survey of the need for wire rope research, the lines along which it should be conducted, and the support that might be expected. Three conferences of representative manufacturers, users, and other interested persons have been held during the past year. Papers describing the use and abuse that wire rope receives in the various fields of its application, have been prepared by prominent men in the industry and have been widely circulated and discussed. The Engineering Foundation, which is cooperating with the Society in the sponsorship of this project, has financed the preparation of a comprehensive review of the literature on the subject which was prepared at the Bureau of Standards.

It is apparent that there is a very real need for greater knowledge of wire rope, its proper use, and inspection. This problem concerns both manufacturers and users, and their support of a cooperative research program seems assured. The Research Committee is now considering the selection of the personnel of a special committee to direct the investigation.

Papers prepared in the review of this subject during 1928-1929 are: "The Need for Wire-Rope Research," by H. L. Whittemore; Monograph and Bibliography on Wire-Rope Research, by A. F. Johnson; and "Wire Rope," a collection of brief reports on various aspects of the problem.

Airplane Vibration with Special Reference to Instruments. Prof. A. Klemin, chairman. Organized November, 1928. The Committee has been engaged in digesting replies to a questionnaire circulated among manufacturers of airplanes, aircraft instruments, and airplane operating companies concerning vibration difficulties at present encountered in the use of airplane instruments with the purpose of making recommendations for the elimination of such difficulties.

Heavy Duty Anti-Friction Bearings. Prof. W. Trinks, chairman. Organized March, 1929. This Committee proposes to investigate the possibilities and limitations of this type of bearing on rolling mills through the means of a fellowship at the Carnegie Institute of Technology. Field tests will be made by the Fellow, whose reports will then be correlated and analyzed. The solicitation of funds to support this work is now in progress.

Slagging of Coal Ash. P. B. Rice, chairman. Organized March, 1929. This Committee is to study the adding of fluxes as a means of increasing the fluidity of slag in large boiler furnaces and thus permitting its removal at operating temperatures. Funds have been raised to start an experimental program at the Bureau of Mines. The construction of a small-scale laboratory furnace for the first phase of the work is nearing completion.

Standardization

The A.S.M.E. Standardization Committee presents the following as its report for the year October 1, 1928, to October 1, 1929.

Organization

The Society has accepted sponsorship or joint sponsorship for a total of 27 sectional committees under the procedure of the American Standards Association. These Sectional Committees have subdivided themselves into 186 subcommittees and subgroups in order that the projects assigned to them may be carried forward with greater speed and efficiency. The personnel of these committees numbers 930 members, of which 360 are members of the A.S.M.E. Sponsorships were accepted this year for Stock Sizes, Shapes and Lengths for Hot and Cold Finished Iron and Steel Bars, in November, 1928, and for Rolled Threads for Screw Shells of Electric Sockets and Lamp Bases, in January, 1929.

During the year the organization meetings were held of the Sectional Committees on Small Hose Couplings, Plumbing Equipment, Wire and Sheet-Metal Gages, Speeds of Machinery, and Rolled Threads for Screw Shells of Electric Sockets and Lamp Bases, and during this same period the following subcommittees of major importance were organized: Malleable Iron or Steel Brass Seat Unions, Rating of Pipe Fittings, Marking of Pipe Fittings, and Socket Head Cap and Set Screws.

Published Standards

Five dimensional standards which had passed completely through the A.S.A. procedure during the twelve months were published in pamphlet form by the Society. They are: Long Turn Sprinkler Fittings, Tool Holders and Tool Post Openings, Identification of Piping Systems, Aeronautical Symbols, and Symbols for Hydraulics. In addition to these the following five proposals have been submitted to the sponsors for approval prior to transmittal to the A.S.A.; Slotted Head Proportions, Graphic Symbols for Telephone and Telegraph Use, Symbols for Photometry and Illumination, Navigational and Topographical Symbols, and Annular Single Row and Wide Type Ball Bearings.

Publicity

Your Committee has assisted in giving publicity to the standards developed by the Sectional Committees sponsored by this Society, by supplying drafts of the proposals to the technical and daily press for reproduction, together with news items covering the various Committee activities. Approximately 10,000 copies of proposed standards have been distributed direct to interested manufacturer and consumer interests, for criticism and comment. During the year 42 pages of text have been published in *Mechanical Engineering* and items of general and timely interest have been run in issues of the *A.S.M.E. News*.

A distinctly new feature was added to this year's program of the Standardization activity. The Committee arranged for a symposium on "The Influence of Standardization on Mechanical Industries" which was held on July 8, in connection with the S.P.E.E. Summer School at Purdue University. Three papers dealing with different phases of the subject were read and a general discussion followed. The papers were: "Standardization in Heat Power Equipment," by A. M. Houser, "Machine-Tool Stand-

ardization," by J. B. Armitage, and "The Effect of Standardization on Quantity Production," by D. B. Charters.

A lecture course on Mechanical Standardization for the use of the A.S.M.E. Local Sections is now in the course of development under the auspices of the two Standing Committees concerned.

Sectional and Subcommittee Reports

Transmission Chains and Sprockets. F. V. Hetzel, chairman. At meetings of Subcommittee No. 1 on Roller Chains held in October, January, and April of this year a careful study was made of the report published jointly by the S.A.E. and A.S.M.E. Committee, and a proposed American Standard for Roller Chains was developed. Copies have been submitted to the members of the Sectional Committee for formal approval by letter ballot.

Subcommittee No. 2 on Silent Chains has developed proposed standard pitches and widths of silent chains. Copies of these proposed standard dimensions have been distributed to the members of the Sectional Committee for review and criticism prior to further discussion at a meeting of the subcommittee.

Shafting. C. M. Chapman, chairman. The Sectional Committee has considered during the year several recommendations for changes and additions to the American Standards for Cold-Finished Shafting (1924), Square and Flat Stock Keys (1925), Plain Taper Stock Keys (1927), and Gib Head Taper Stock Keys (1927). Revised drafts were prepared and copies widely distributed for criticism and comment. A survey of industry was also made to ascertain the desirability of standardizing multiple keys for shafting, the results of which indicated that such a move was not desirable at this time, owing to the increasing tendency on the part of machine designers to use splines and splined shafts. The replies are now being summarized for review prior to a meeting of the Committee.

Subcommittee No. 5 on Woodruff Keys. L. C. Morrow, chairman. Tables giving Woodruff Keyslot and Keyslot Cutter dimensions have been prepared and added to the 1928 draft of the proposed table of key dimensions. Revised page proof copies were distributed for general criticism and comment in February. The subcommittee is now considering the suggestions received prior to a meeting in October.

Plain Limit Gages. E. C. Peck, chairman. The revised reports of Subcommittees No. 2 on Methods of Gaging and No. 3 on Specifications for Plain Limit Gages which were distributed in proof form in May, 1927, have been held without action pending the results of the work of the American Gage Design Committee.

Ball Bearings. F. W. Gurney, chairman. It is with sincere regret that we report the death of W. R. Strickland in January of the present year. He had been the chairman of the Sectional Committee since its organization.

A meeting of the Sectional Committee was held on May 22 for the review of the proposed American Recommended Practice on Annular Single Row and Wide-Type Ball Bearings. After several slight changes were made the proposals were found to be acceptable to the Committee and in September they were approved by the A.S.M.E. as one of the joint sponsors with the S.A.E.

Elevators. An interchange of correspondence on the proposed activity of this Sectional Committee has resulted in a recommendation that this

project be merged with that of the Sectional Committee on a Safety Code for Elevators and its Research Committee on Elevators. At least the research activity must precede standardization.

Gears. B. F. Waterman, chairman. Of the eight technical subcommittees of this Sectional Committee No. 4 on Spur-Gear Tooth Form, No. 8 on Materials, and No. 9 on Inspection have been most active. The second proposal to come from the Subcommittee on Tooth Form, H. J. Eberhardt, chairman, covers $14\frac{1}{2}$ and 20-Degree Full-Depth Tooth Form for the Involute System. Tentative drafts of this proposed standard were widely distributed in January, 1929, for criticism. A revision of the proposal which is now being made will be submitted to the Sectional Committee for approval.

Shortly after the beginning of the year subcommittee No. 8 on Materials, T. L. Lynch, chairman, decided to delay the presentation of the proposed standard specifications for Forged and Rolled-Carbon Steel for Gears until it had completed its work on specifications for Cast and Alloy Steel for Gears and Brass and Bronze for Gears. The combined proposal was mailed in printed form for criticism and comment during the month of March, 1929. The suggestions received are now being considered by the Committee which is cooperating completely with a similar committee of the American Gear Manufacturers Association of which C. B. Hamilton is chairman.

In March of this year Subcommittee No. 9 on Inspection, G. L. Markland, Jr., Chairman, distributed for general criticism and comment printer's proof copies of a revised proposal for an American Recommended Practice on the Inspection of Gears. The large number of replies received will be considered at a joint meeting of this Sub-Committee with the A.G.M.A. Committee on this subject scheduled during the A.G.M.A. fall convention to be held in Philadelphia, October 24 to 26, 1929.

Standardization and Unification of Screw Threads. R. E. Flanders, chairman. During the past year the Sectional Committee was reorganized under the joint sponsorship of the A.S.M.E. and the S.A.E. The following subcommittees were formed: No. 1, Scope, Arrangement and Editing; No. 2, Terminology and Thread Specifications, except Gages; No. 3 Special Threads and Twelve-Pitch Series, except Gages; No. 4, Acme and Other Similar Threads, except Gages; No. 5, Screw-Thread Gages.

A meeting of Subcommittee No. 1 on Scope, Arrangement and Editing was held during the first week of October.

Pipe Flanges and Fittings. C. P. Bliss, chairman. Two meetings of this Sectional Committee have been held for the consideration of recommendations prepared by its subcommittees. These meetings were held in October in New York and in May in Rochester. At the first of these meetings the chairman was authorized to appoint two subcommittees: No. 7 on Rating of Pipe Fittings and No. 8 on Marking of Pipe Fittings. Both of these new subcommittees held their organization meetings in Rochester in May.

The proposed standard, 800-lb. Hydraulic Cast-Iron Pipe Flanges and Flanged Fittings, was submitted in December by Subcommittee No. 1, A. M. Houser, chairman, to the members of the Sectional Committee for approval by letter ballot. Since this vote was not clear the proposal was again discussed at the May meeting and modifications made to meet the needs of certain groups. The proposed standard is now being prepared for submission to the sponsor organizations.

The joint work of Subcommittees No. 1 and No. 2, i. e., the American Standard for Long-Turn Sprinkler Fittings, was approved by the A.S.A.

and published by the A.S.M.E. in April, 1929. This was the third standard prepared by Subcommittee No. 2 on Screwed Fittings, of which Stanley G. Flagg is chairman.

Subcommittee No. 3 has been active. In November a proposed standard for 150 lb. Steel Pipe Flanges and Flanged Fittings was mailed to interested manufacturers and consumers for review. In addition a proposed standard for 250, 400, 600, and 900 lb. Steel Companion Flanges was widely distributed in February for criticism and comment. The replies to this circularization were studied by the subgroup in charge of this proposal at its meeting in May, and it decided to mail a questionnaire to industry seeking further information relative to the satisfaction given by the present steel flange standards.

Subcommittee No. 5, Face-to-Face Dimensions of Ferrous Flanged Valves, of which F. H. Morehead is chairman, held a meeting in Rochester at which it reviewed the dimensions employed by the various companies in the manufacture of globe, angle, swing check, horizontal check, wedge check, and double disk valves for working pressures of 125 and 250 lb. However, the information gathered at that date was so incomplete for several types that it was decided not to issue a definite recommendation until the study was finished.

In October, 1928, the organization meeting of Subcommittee No. 6 on Malleable Iron and Steel Brass Seat Unions for Minimum Steam Pressure of 300 lb. was held in New York, and Prof. C. P. Bliss was elected temporary chairman. A very full discussion of the problem before the Committee took place, after which it voted to await the results of the work of the American Railway Association's Committee on this subject; this Committee presented its report to the Association in June, so the manufacturer's group of members in the subcommittee are now studying this proposal pending its submission to all members of the subcommittee with recommendations.

Bolt, Nut and Rivet Proportions. A. E. Norton, chairman. One meeting of this Sectional Committee was held in October in New York.

A tentative draft of the proposed American Standard for Large Rivets was widely distributed for review in October, 1928. Subcommittee No. 1, which prepared this proposal, has practically completed its study of the comments received. The previous work of this Committee covered Standards for Small and Special Rivets. These were approved and published in 1927 and 1928, and have since been generally accepted by industry.

During the year Subcommittee No. 2 on Wrench Head Bolts and Nuts has been considering the slight revision of the tentative standard approved and published in 1927. The suggestion for the changes came from the Bolt, Nut and Rivet Manufacturers' Association, and a compromise has been reached which it is believed will be acceptable to the members of the Sectional Committee.

At a meeting of the Sectional Committee held in October, 1928, the results of the letter ballot on Slotted Head Proportions was canvassed and endorsed. The proposed American Standard was submitted to the S.A.E. and the A.S.M.E., the two sponsor bodies, in April. The Council of the A.S.M.E. gave its approval in June, and the Committee is now awaiting approval by the S.A.E.; E. W. Reed is Chairman of Subcommittee No. 3.

The Subcommittee on Track Bolts and Nuts, of which C. W. Squier is chairman, distributed in April for general criticism and comment copies of the Committee's proposal based on the results of tests by several railroads. The Committee is now considering the comments received prior to submitting them to the Sectional Committee for approval by letter ballot.

At the request of the manufacturers of socket-head cap and set screws Mr. Norton, chairman, appointed Subcommittee No. 9 to develop a set of

standards for this product. The new subcommittee held its organization meeting in April and H. Koester was elected chairman. The committee drafted a preliminary proposal which was later distributed for review. A second meeting was called early in October.

Scheme for the Identification of Piping Systems. A. S. Hebble, chairman. The proposed American Recommended Practice for the Identification of Piping Systems submitted to the A.S.A. in July, 1928, received its formal approval in November, 1928, and was made available in pamphlet form at the time of the Annual Meeting of the A.S.M.E. in December, 1928.

Small Tools and Machine Tool Elements. C. W. Spicer, chairman. A meeting of the Sectional Committee was held in December to review the progress made by the various technical committees.

Technical Committee No. 2 on Tool-Holder Shanks and Tool-Post Openings, P. M. Mueller, chairman. After approval by the sponsors, the proposed American Standard for Tool Holders and Tool-Post Openings was submitted to the A.S.A. for approval and designation as an American Standard. This approval was given in April, 1929, and the standard was made available immediately in pamphlet form.

Technical Committee No. 3 on Machine Tapers. E. F. DuBrul, chairman. This Committee held two meetings, one in December and another in May, but its members were unable to agree upon a single standard-taper series. They finally decided to send a second questionnaire to industry requesting an expression of opinion on two proposed taper series. The returns from this questionnaire, which numbered 650 copies, are still being received.

Technical Committee No. 4 on Spindle Noses and Collets, E. F. DuBrul, chairman. This activity is being carried on in cooperation with a Committee of the N.M.T.B.A. Progress is rather slow because of the experimental work necessary for the development of a new spindle nose.

Technical Committee No. 5 on Milling Cutters, C. W. Machon, chairman. Sections of the proposed standard for Milling Cutters dealing with Nomenclature, Keyways, Profile and Formed Milling Cutters were released for distribution by the Committee at its meeting on December 5. Copies of these tentative drafts were submitted to industry for criticism and comment in January. A final revision of this material is now in process prior to submission to the members of the Sectional Committee for approval by letter ballot.

Technical Committee No. 6 on Designations and Working Ranges, E. F. DuBrul, chairman. The organization meeting of this technical committee was held in December. At that time it was reported that the result of a survey made jointly by the War Department and the N.M.T.B.A. could be used as the basis of the committee's work. A reasonable amount of progress was made during the remaining nine months.

Technical Committee No. 7 on Twist Drill Sizes, C. J. Oxford, chairman. The committee has held two meetings during the past year, in December and May, respectively, and has submitted to industry for comment two proposed standard series for Twist Drill Diameters and Lengths. The replies received have been reviewed by the Technical Committee and referred to a special subgroup for study and for the development of a new proposal.

Technical Committee No. 8 on Drill Bushings, C. E. Rundorff, chairman. A recommendation of a special subgroup of this Committee has been presented to the Technical Committee for review. Several changes were suggested, and the subgroup is now preparing a revised proposal. This Committee has held its meetings jointly with Technical Committee No. 7.

Technical Committee No. 9 on Punch and Die Holders, S. Diamant, chairman. The Committee has held two meetings during the past year

and subdivided its activity among two subgroups. These subgroups on (1) Sizes and Dimensions and (2) Styles and Materials have been active and are now preparing proposals for submittal to the Technical Committee at its next meeting.

Technical Committee No. 10 on Circular Forming Tools. This Technical Committee is now in the process of organization by the Executive Committee of the Sectional Committee on Small Tools and Machine-Tool Elements.

Technical Committee No. 11 on Chucks and Chuck Jaws, J. E. Lovely, chairman. This Committee has been active and has developed proposals covering several parts of its work. Three meetings have been held during the year.

Technical Committee No. 12 on Taps, Cut and Ground Thread, C. M. Pond, chairman. This Committee made a very careful study of the report prepared by the Subcommittee appointed by the N.S.T.C. and the Tap and Die Institute. Copies of the tentative draft of its report were then submitted to industry for criticism and comment in September, 1929. Meetings of the Committee were held in December and May of the past year.

Scientific and Engineering Symbols and Abbreviations. J. F. Meyer, chairman. This Sectional Committee has been very active during the past year and has completed several proposals which were later approved as American Standards by the A.S.A. They are: Symbols for Hydraulics, July, 1929; Symbols for Aeronautics, February, 1929; Letter Symbols for Electrical Quantities, November, 1928; and Graphical Symbols for Telephone and Telegraph Use, July, 1929.

In June Prof. J. T. Faig, Chairman of Subcommittee No. 1 on Symbols for Mechanics, Structural Engineering and Testing Materials, completed and distributed for criticism and comment a tentative draft of his Committee's proposal. A study of the replies is now being made.

After passing completely through the procedure laid down by the A.S.A. the proposed American Tentative Standard for Symbols for Hydraulics prepared by Subcommittee No. 2, G. E. Russell, chairman, was approved in July.

At a meeting of Subcommittee No. 3 on Symbols for Heat and Thermodynamics in October, 1928, the Committee discussed the changes and additions proposed in the replies received as a result of the general distribution of its preliminary report. It later included the Symbols for Heat Transmission developed by the Joint Committee on Heat Transmission of the National Research Council. Another meeting is planned for early in October, 1929, after which the proposal will be submitted to the Sectional Committee for approval.

The proposed standard on Symbols for Photometry and Illumination was approved by the Sectional Committee in May of the past year and was submitted to the sponsor organizations who are now voting on its approval. The A.S.M.E. has already signified its approval. E. C. Crittenden is chairman of Subcommittee No. 4.

Symbols for Aeronautics developed by Subcommittee No. 5, of which Prof. J. S. Ames is chairman, were approved by the sponsor organizations and later designated as an American Tentative Standard by the A.S.A. in February, 1929.

Two proposed standards developed by Subcommittee No. 7 on Electrotechnical Symbols, J. F. Meyer, chairman, have been approved this year by the A.S.A; these are Letter Symbols for Electrical Quantities and Graphical Symbols for Telephone and Telegraph Use. The Subcommittee is now engaged in the development of Symbols for Electric Power, including

Interior Wiring, and Traction, including Railway Signaling. Graphical Symbols used in Radio Communications are now being voted upon by the Sectional Committee.

The proposed standard, Symbols for Navigation and Topography, was approved by the Sectional Committee in May and is now before the sponsors for approval prior to submittal to the A.S.A. The A.S.M.E. approval was given in September. This standard is the work of Subcommittee No. 8, of which G. L. Hasmer is chairman.

The proposed American Tentative Standard for Abbreviations of Engineering and Scientific Terms was distributed for general criticism in November. Since then Subcommittee No. 9 has considered the recommended changes and the Sectional Committee is now voting upon the proposal in revised form. G. A. Stetson is chairman of this Subcommittee.

Machine Pins. M. E. Steczynski, chairman. A proposed standard for Machine Pins has been submitted to the members of the Sectional Committee for study prior to general distribution for criticism and comment.

Plain and Lock Washers. C. W. Squier, chairman. No report has been received from Subcommittee No. 1 on Plain Washers, of which F. Doepke is chairman. Subcommittee No. 2 on Lock Washers, C. H. Loutrel, chairman reviewed a proposed Standard for Lock Washers at its meeting on May 16. The suggested dimensions for several elements were questioned and it was recommended that tests be made with washers of the proposed dimensions before further action was taken.

Drawings and Drafting-Room Practice. F. DeR. Furman, chairman. While no meetings of the Sectional Committee were held during the past year, the members of the Sectional Committee have been at work through its several subcommittees.

Subcommittee No. 5 on Line Work, of which S. Ketchum is chairman, has been most active this past year. In November, 1928, a second draft of this section of the proposed standard was circulated for review by interested persons. The replies received prompted the Committee to modify and extend the preliminary report. A redraft will be presented to the Sectional Committee for discussion in December.

A redraft of the section on Method of Indicating Dimensions, prepared by Subcommittee No. 2, E. B. Neil, chairman, is in course of preparation for general distribution. Material covering each of the sections on Specifications for Paper and Cloth, Lettering, and Graphic Symbols is in the hands of the corresponding subcommittees, but no definite progress has been made during the year.

Code for Pressure Piping. E. B. Ricketts, chairman. One meeting of the Sectional Committee was held in December to consider the reports made by the Subcommittees and to assist them in their further development. Another meeting is scheduled for next December.

Eventually this Code will contain sections dealing with Power Piping, Gas and Air Piping, Oil Piping Systems, Hydraulic Piping, Refrigerating Piping Systems, Piping Materials, and Fabrication Details. The first three of these sections, prepared by Subcommittee No. 2, J. H. Lawrence, chairman, Subcommittee No. 4, Alfred Iddles, chairman, and Subcommittee No. 6, A. D. Sanderson, chairman, respectively, are now in type and have been distributed for review by interested individuals and firms. The comments received are in the hands of the several committees. The remaining sections are still in various stages of development by their individual subcommittees.

Graphic Presentation. E. F. DuBrul, chairman. Although this has not been a year of marked activity by this Sectional Committee, a large percentage of its members have been at work through the activities of the Subcommittees.

Under the leadership of its chairman, R. J. McFall, Subcommittee No. 2 on Terminology completed and distributed in November for criticism and comment a preliminary draft of a part of the task assigned to it. The suggestions received have prompted the Committee to revise and enlarge its original proposal.

At a meeting held in December Subcommittee No. 6 on Engineering and Scientific Graphs, W. A. Shewhart, chairman, discussed certain data which had been prepared by its chairman and decided to make a further study of the methods now employed for presenting graphically engineering and scientific data before drafting a definite proposal.

Pipe Threads. E. M. Herr, chairman. This project has been subdivided among Subcommittees on Taper Pipe Threads, Straight Pipe Threads, Plumbers' Special Threads, Screw Threads for Rigid Electric Conduit, and Special Threads for Thin Tubes.

During the Annual Meeting of the Society last December, Subcommittee No. 3 on Straight Pipe Threads, A. S. Miller, chairman, and Subcommittee No. 6 on Special Threads for Thin Tubes, C. C. Winter, chairman, held meetings in New York. At both of these meetings considerable progress was made on these two parts of the project. The first meeting of Subcommittee No. 4 on Plumbers' Threads has been scheduled for October 15. Mr. L. A. Cornelius, chairman of the Committee, has been compiling data preparatory to the meeting.

Wire and Sheet-Metal Gaging Systems. W. W. Hutchins, chairman. The Sectional Committee for the Standardization of Wire and Sheet-Metal Gaging Systems was organized in November, 1928. Subcommittees were formed to initiate proposals for the standardization of the following: No. 1, Flat Stocks; No. 2, Wires and Rods; and No. 3, Tubing, Piping, Conduit, and Casing. These Subcommittees have been active during the past year, but their proposals have not been developed sufficiently to warrant general distribution for criticism and comment.

Plumbing Equipment. W. C. Groeniger, chairman. The Sectional Committee on the Standardization of Plumbing Equipment held its organization meeting in November, 1928. Subcommittees were authorized on the following parts of the subject: No. 1, Code for Plumbing; No. 2, Staple Vitreous-China Plumbing Fixtures; No. 3, Staple Porcelain (All-Clay) Plumbing Fixtures; No. 4, Enameled Sanitary Ware; No. 5, Traps; and No. 6, Brass Plumbing Products. The first four of these Subcommittees have the same personnel as the Standing Committees on the same subject organized by the U. S. Department of Commerce.

Since the meeting of the Sectional Committee the Chairman has given some time to developing the personnel of Subcommittee No. 5 on Traps and Subcommittee No. 6 on Brass Plumbing Products. The last named Committee held its organization meeting in April and subdivided its activity among subgroups on the following products: No. 1, Compression Cocks, Washer Screws, Faucets and Tail-Piece Parts; No. 2, Flushing-Tank Mechanism and Flush Valves, Supply Pipes and Connections, Escutcheons; No. 3, Fixture Connections and Fixture Valves, Waste Holes, Plugs and Connections, Overflows; No. 4, Valves; No. 5, Shower-Heads Diameter Connections and Sizes; No. 6, Water-Works Brass; and No. 7, Nomenclature. These subgroups are now at work on the development of their several proposals.

Wrought-Iron and Wrought-Steel Pipe and Tubing. H. H. Morgan, chairman. In October, 1928, the Subcommittee on Plan, Scope, and Editing held a meeting in New York, and in Chicago, the following March, Subcommittees Nos. 2, 3, and 4 and the Sectional Committee held a group of meetings. Good progress was reported by all four Subcommittees in their study of the several A.S.T.M. Specifications which are to form the basis of their proposals. The proposed table of Dimensions and Weights of Lap Welded and Seamless Pipe for High Temperature Service was approved and ordered transmitted to the two sponsor bodies.

Electric Motor Frame Dimensions. W. F. Dixon, chairman. The Working Committee held its second meeting in Detroit in June, when it completed and unanimously approved a proposal for Mounting Dimensions of Low-Voltage 60-Cycle Squirrel-Gage Induction Motors. In July this report was set in type and in August it was distributed to the members of the Sectional Committee for their review and criticism. Since no adverse comment had been received a letter ballot form was mailed to each member for his use in recording formal approval. This balloting is still in progress.

Speeds of Machinery. A. E. Hall, chairman. The Sectional Committee on Speeds of Machinery was organized in October, 1928. At that time a Subcommittee on Plan and Scope was appointed and a report of this Subcommittee is expected during the fall season.

Screw Threads for Hose Couplings. H. W. Bearce, chairman. This Sectional Committee was organized in October, 1928, and at that meeting two subcommittees were appointed to initiate the standardization of (1) Hose-Coupling Threads for Use in Fire Protection and (2) Hose-Coupling Threads for Other Uses.

Under the leadership of J. H. Howland, its chairman, the first of these subcommittees was very active during the year. It developed a proposal covering general thread specifications for the various sizes of small-hose couplings intended for (a) stand pipes, (b) chemical hose, and (c) play-pipe connection.

Fire-Hose Couplings. The universal acceptance of the American Standard for Fire-Hose Couplings Threads by the cities and towns of the United States, the Gaging of Couplings, and the conversion of existing equipment to these standard dimensions has been promulgated during the year with the aid of the National Board of Fire Underwriters, the Chamber of Commerce of the United States, and the A.S.M.E. Local Sections.

Rolled Threads for Screw Shells of Electric Sockets and Lamp Bases. R. E. Myers, chairman. The Sectional Committee which is sponsored jointly by the N.E.M.A. and the A.S.M.E. held its organization meeting at the A.S.M.E. headquarters in June and at that meeting a Subcommittee was appointed to draft the preliminary proposal. The Subcommittee met immediately after the adjournment of the Sectional Committee meeting and made plans for the initiation of the several parts of its work.

Stock Sizes, Shapes, and Lengths for Hot and Cold Finished Iron and Steel Bars. In October the American Standards Association approved the recommendation of the A.S.M.E. for the Standardization of Stock Sizes, Shapes, and Lengths for Hot and Cold Finished Iron and Steel Bars and invited the A.S.M.E. to accept sole sponsorship for the project. This sponsorship was accepted, and in April forty national organizations were invited to appoint official representatives to serve on this Sectional Committee. Arrangements are now being made for the holding of the organization meeting.

Power Test Codes

The Committee on Power Test Codes submits the following report for the fiscal year ending September 30, 1929:

During the year one additional test code and three chapters of Instruments and Apparatus were issued in final pamphlet form.

Test Code for Gas Producers
Instruments and Apparatus—Part 2, Pressure Measurements: Chapter 1 on Barometers, and Chapter 6 on Tables, Multipliers, and Standards for Barometers, Mercury Columns, and Pressure Measurements; Part 21, Leakage Measurement: Chapter 1 on Condenser Leakage Tests.

In the same period the stocks of the pamphlet copies of the following four codes were exhausted so these codes are now undergoing revision by their respective committees before reprinting:

Code on General Instructions
Code on Definitions and Values
Test Code for Stationary Steam Boilers
Test Code for Internal-Combustion Engines.

Eighteen of the 24 test and supplementary codes on the program of the Committee on Power Test Codes are now in final pamphlet form. During the period from 1922 to 1927, inclusive, the following 17 codes and one part of Instruments and Apparatus were issued in pamphlet form:

Code on General Instructions
Code on Definitions and Values
Test Code for Solid Fuels
Test Code for Stationary Steam Boilers
Test Code for Reciprocating Steam Engines
Test Code for Steam Turbines
Test Code for Reciprocating Steam-Driven Displacement Pumps
Test Code for Centrifugal and Rotary Pumps
Test Code for Displacement Compressors and Blowers
Test Code for Condensing Apparatus
Test Code for Feedwater Heaters
Test Code for Refrigerating Systems
Test Code for Evaporating Apparatus
Test Code for Steam Locomotives
Test Code for Internal-Combustion Engines
Test Code for Hydraulic Power Plants and Their Equipment
Test Code for Speed-Responsive Governors
Instruments and Apparatus; Part 1, General Considerations.

The Test Code for Water-Cooling Equipment was presented for discussion at a Public Hearing in December, 1928, and is now receiving its final revision by Individual Committee No. 12 on Condensers, Water-Heating and Cooling Equipment.

Considerable progress has been made in the development of the Test Code for Liquid Fuels. In the preparation of this Code Individual Committee No. 3 has worked in close cooperation with the A.S.T.M. Committee D-2 on Petroleum Products and Lubricants, and certain of the A.S.T.M. specifications have been adopted as standards in the A.S.M.E. Test Code for Liquid Fuels.

During the final stages in the development of the Test Code for Gas Producers, Individual Committee No. 16 on Gas Producers cooperated with the American Gas Association's Sub-Committee on Gas Producer Opera-

tion. It rendered valuable assistance to the A.S.M.E. Committee by reviewing printer's proofs of the Test Code and offering suggestions for changes and additions.

The publication of preliminary drafts of the Power Test Codes and other related material in *Mechanical Engineering* for the year has filled 12 pages.

The personnel of Individual Committee No. 10 on Centrifugal and Turbo-Compressors and Blowers has been entirely reorganized. It is expected that early this fall the new committee will begin work on the development of the Test Code for Centrifugal and Turbo-Compressors and Blowers.

For the purpose of cooperating with the A.S.M.E. Power Test Codes Committee, the American Institute of Electrical Engineers has appointed through its Electrical Machinery Committee a committee of three members which has been instructed to hold itself in readiness to accept membership on committees which the A.S.M.E. may appoint to revise the various test codes which include sections dealing with electrical machines, such as engine driven generators, waterwheel driven generators, motors driving air compressors, pumps, etc. The personnel of the Committee consists of Everett S. Lee, M. W. Smith, and Gordon Thompson.

The Committee records with deep regret the death of its former Chairman and member, George H. Barrus. It was Mr. Barrus who developed the general plan for the comprehensive and thorough revision and extension of the A.S.M.E. Power Test Codes begun in 1909 and published in 1915. He served effectively as Chairman of the Power Test Codes Committees from 1911 to 1918, inclusive. With similar feelings of regret the Committee reports the death of one of its co-workers, Prof. George A. Goodenough, who has been active in the work of the Committee since its reorganization in 1918.

A résumé of the progress which has been made during the year in the preparation of the various parts and chapters of Instruments and Apparatus is as follows: Part 3, Temperature Measurement, Chapter 7, Metal Bulb and Capillary Tube Thermometers (Pressure-Gage Thermometers) appeared in the October, 1928, issue of *Mechanical Engineering;* Part 6, Electrical Measurements, appeared in abstract form in the December, 1928, issue of *Mechanical Engineering;* and Part 13, Speed Measurement, in the April, 1929, issue. The development of the following Parts and Chapters has progressed appreciably within the past year: Part 5, Measurement of Quantity of Material; Part 8, Measurement of Indicated Horsepower; Part 11, Measurement of the Quality of Steam; Part 16, Density Determinations; Part 17, Determination of the Viscosity of Liquids.

Through its membership on the U. S. National Committee of the International Electrotechnical Commission, the Society and the Main Committee on Power Test Codes has been actively engaged in assisting in bringing about international agreements covering acceptance tests for hydraulic and steam turbines.

The Society's representatives on the U. S. National Committee are: Fred R. Low, William F. Durand, Francis Hodgkinson, C. Harold Berry, and H. Birchard Taylor.

Following the New York meeting of the International Electrotechnical Commission, held in April, 1926 (the A.S.M.E. and the Main Committee on Power Test Codes participating), the U. S. National Committee of the I.E.C. was designated as the Secretary of I.E.C. Advisory Committee No. 4 on Prime Movers, with Dr. Fred R. Low, Chairman of the Power Test Codes Committee, named as Director, and C. B. LePage, Assistant Director. The A.S.M.E Committee on Power Test Codes had been recognized as the authoritative group in the United States on the testing of prime movers and other auxiliary apparatus. Accordingly in preparation for a

meeting of the Advisory Committee held at Bellagio, Lake Como, Italy, in September, 1927, the Secretariat developed a group of proposals which it believed would assist in unifying and accelerating the work of the Advisory Committee relative to hydraulic and steam turbines. These proposals had to do with the establishment of a definite outline for international documents on the testing of these prime movers. At this same meeting Advisory Committee No. 4 was divided into two separate committees, namely Advisory Committee No. 4 on Hydraulic Turbines and Advisory Committee No. 5 on Steam Turbines, because of the development and expansion of the work. It was agreed also that the United States should hold the Secretariat for both of these committees. The international document on the testing of hydraulic turbines was completed by the Advisory Committee and approved by the Plenary Meeting of the Commission at Bellagio.

Substantial progress toward the completion of the I.E.C. Document on Steam Turbines was made at the meeting of I.E.C. Advisory Committee No. 5 held in London, July 1 to 6, 1929. This was the fourth meeting at which the subject was discussed, the previous meetings having been held at New York (1926); Bellagio, Italy (1927); and The Hague, Holland (1928). During the past three years the Secretariat has been charged with the responsibility of preparing and editing most of the proposals which have been studied at the several meetings. The bases of these proposals are the specifications or codes which previously have been formulated by the interested engineering and industrial groups of the several member countries. Dr. William F. Durand presided at this as well as the Bellagio and New York meetings, and with Francis Hodgkinson and Irving E. Moultrop represented the U. S. National Committee of the I.E.C. while Clifford B. Le Page attended on behalf of the Secretariat.

The first part of the complete document is known as "Specifications." These specifications cover definitions and information to be supplied with inquiry or order and the appendix may contain recommended standard ratings and steam pressures relevant to an international document on steam turbines. The second part consists of "Rules for Acceptance Tests."

During the coming year the Secretariat and a special editing committee will complete the further revision of this material in time for final consideration by Advisory Committee No. 5 prior to and during the Stockholm meeting in 1930. In addition to Parts I and II the I.E.C. Document on Steam Turbines will have an appendix dealing with instruments and methods of measurement. Considerable progress has been made in the development of the paragraphs of this appendix, but its completion and inclusion in the I.E.C. document will probably require a year or two longer.

The 20 individual committees and the Main Committee now include in their personnel 115 members of the Society and 13 non-members.

Safety

The A.S.M.E. Safety Committee reports progress on the safety projects in which the Society has been interested during the past year.

Liaison Representatives. George E. Sanford, chairman, reports that the liaison representatives of the National Safety Council and the A.S.M.E. are now functioning and are in close touch with the Local Safety Councils of the National Safety Council and the A.S.M.E. Local Sections and Student Branches, and since their appointment, active cooperative contact on safety subjects has been established with about one-half of the A.S.M.E. Local Sections.

Publicity. The Committee has published in the Engineering and Industrial Standardization department of *Mechanical Engineering* various items pertaining to its work, and has requested that authors of papers include

safety features; this has been done throughout the year. Five-minute talks on safety were given before several of the sessions at the Rochester Meeting of the Society.

Safety Code Correlating Committee. On the recommendation of the Safety Committee, Colonel John Price Jackson was recommended to the President for reappointment as the Society's representative on the Safety Code Correlating Committee associated with the American Standards Association.

Safety Codes. The A.S.A. present program includes 46 safety code projects. The A.S.M.E. is sponsor or joint sponsor for the following five Sectional Committees and has representation on 23 Sectional Committees.

Safety Code for Mechanical Power Transmission Apparatus.
Safety Code for Elevators.
Safety Code for Machinery for Compressing Air.
Safety Code for Conveyors and Conveying Machinery.
Safety Code for Cranes, Derricks and Hoists.

Personnel. Up to October 1 the Sectional Committees which are formulating these safety codes had organized 22 subcommittees and subgroups which with the Sectional Committee make a total of 23 committees of the Society at work on our safety program. There are 92 A.S.M.E. members and 129 non-members serving on these committees.

Activities of Sectional Committees. G. P. Smith, Jr., the A.S.M.E. representative on the Sectional Committee on the Safety Code for Amusement Parks and Chairman of the Committee of the National Association of Amusement Parks, reports that the Sectional Committee has been engaged in gathering data relating to the design, construction, operation, and maintenance of amusement parks and their equipment. He also reports the adoption by the National Association of Amusement Parks of a tentative set of operation regulations and their printing by the U. S. Fidelity and Guaranty Co. of Baltimore, which carries over 80 per cent of this casualty insurance.

The Sectional Committee on a Safety Code for Elevators presented its Code for approval and publication in 1925. The Subcommittee on Research, Interpretations, and Recommendations formed in 1926 has met regularly each month during the past year, and copies of the Safety Code for Elevators have been distributed by the Secretary of the Sectional Committee to various state officials on application. The subcommittee on Inspectors' Handbook also held meetings and now expects to present shortly its recommendations for approval and publication.

The Sectional Committee on a Safety Code for Mechanical Power Transmission Apparatus completed its Code in 1923, and in November, 1927, the Code was raised to the status of an American Standard by the American Standards Association. During the fall of 1928 it was decided to consolidate the work of the proposed Sectional Committee on a Safety Code for Mechanical Power Control with that of the Committee on Mechanical Power Transmission Apparatus, and on February 20, 1929, the Subcommittee on Mechanical Power Control held its first meeting. This Subcommittee has held three meetings and expects to report at a meeting of the Sectional Committee to be held early in October.

The Sectional Committee on a Safety Code for Conveyors and Conveying Machinery held a conference of subcommittee chairman during the Annual Meeting last December. Several of the subcommittees have also held meetings and reports have been received from Subcommittees Nos. 2 and 5. Four Sections of the Code are now in process.

The various Subcommittees of the Sectional Committee on a Safety Code for Cranes, Derricks, and Hoists have been working steadily upon their individual sections of the Code and it is expected they will be ready to present to the Editing Committee within a short time.

The A.S.M.E. has representation on the following sectional and other safety committees:

Safety Code Correlating Committee
Sectional Committee on Safety Code for Abrasive Wheels
Sectional Committee on Safety Code for Floor Openings, Railings, and Toe Boards
Sectional Committee on Safety Code for Industrial Sanitation
Sectional Committee on Safety Code for Lighting Factories, Mills, and Other Work Places
Sectional Committee on Safety Code for Forging and Hot Metal Stamping
Sectional Committee on Safety Code for Ladders
Sectional Committee on Safety Code for Laundries
Sectional Committee on Safety Code for Logging and Sawmill Machinery
Sectional Committee on Safety Code for Machine Tools
Sectional Committee on Safety Code for Paper and Pulp Mills
Sectional Committee on Safety Code for Power Presses
Sectional Committee on Safety Code for Rubber Machinery
Sectional Committee on Safety Code for Walkway Surfaces
Sectional Committee on Safety Code for Amusement Parks
Sectional Committee on Safety Code for Window Washing
Sectional Committee on Safety Code on Colors for the Identification of Gas Mask Canisters
Sectional Committee on Safety Code on Ventilation for Metal Mines
Sectional Committee on Safety Code on Ventilation in Coal Mines
Sectional Committee on Safety Code for Ventilation
Sectional Committee on Textile Safety Code
Special A.S.S.E. Committee on Low Voltage Electrical Hazard

Professional Conduct

During the fiscal year 1928-1929, the Society received five requests for advice on professional ethics. Only one case has been submitted to the Committee on Professional Conduct and was duly acted on but did not require Council ruling. No breach of professional conduct was found. The Committee feels that this is a very fine record for a Society of over 18,500 members.

Boiler Code

The Boiler Code Committee presents the following report for the fiscal year ending September 30, 1929:

During this period the Committee held nine regular meetings devoted to interpretations and to the consideration of revisions and addenda upon the various sections of the Code. The meetings continue to be of marked importance to the boiler and pressure vessel industry and with the recent developments in this field, many question of vital nature are submitted. The service rendered to the public is of incalculable value in providing for new developments and practice.

The Committee has cooperated actively with the American Marine Standards Committee and the U. S. Steamboat Inspection Service in the formu-

lation of marine codes. Several conferences have been held which have been effective in bringing the proposed new marine boiler rules into closer conformity with the power boiler rules of the Boiler Code Committee.

Cooperation with the American Society for Testing Materials is carried on to the great advantage of the industry; during the year three new specifications adopted by the A.S.T.M. have been accepted by the Boiler Code Committee, covering carbon-steel castings for valves, flanges and fittings for high-temperature service, alloy-steel bolting material for high-temperature service, and forged- or rolled-steel pipe flanges for high-temperature service. In addition, a number of detail revisions have been made in the material specifications in Section II of the Code in order to keep them in complete harmony with the identical specifications of the A.S.T.M., as these latter have been modified and improved.

The Committee has made a number of revisions in the various sections of the Boiler Code as a result of requests from manufacturers, inspectors, users, and others. These revisions were formally adopted by the Council and distributed in pink-colored addenda sheets on July 1, 1929. It is the Committee's understanding that these revisions, while now acceptable in the various states and cities in which the Boiler Code is operative, will not become mandatory there until January 1, 1930, thereby allowing a reasonable period of grace after they are announced.

The extensive interest in the subject of welding continues. The long discussion of the rules for welding in the Code for Unfired Pressure Vessels has been terminated by the adoption of a "Recommended Procedure for Fusion Welding of Pressure Vessels," developed by the American Welding Society, which has led to revision allowing greater latitude for welding in the construction of such vessels. Requests have been received for the consideration of a procedure for electric-arc welding that will permit the adoption of rules covering the electric welding of boiler drums. Specifications for fusion welding of drums of power boilers have been drafted and are now in the hands of the Conference Committee of the American Welding Society for their study and approval. As soon as an expression of opinion is received from the American Welding Society, action will be taken to publish the recommended rules in *Mechanical Engineering* for public comment and criticism.

The Committee has formally adopted a standard practice for making an hydrostatic test on a boiler pressure part to determine the maximum allowable working pressure. These rules will appear in the Appendix to the Code and will modify the present requirements of the Code, that where it is impossible to calculate the strength of a boiler structure, a sample be tested in the presence of representatives of the Boiler Code Committee.

Intensive studies under way on a number of subjects that are of vital importance to the industry include the cold bending of boiler plate, the stresses that exist in cylindrical structures at holes cut in shells, the reinforcement of such openings in shells, the stresses that may be safely used with boiler-plate steels at elevated temperatures, etc. The Committee feels that there is much valuable information to be gained from the various forms of stress analyses, such as strain-gage tests, fatigue tests under repeated applications of pressure, etc., and the Committee is encouraging their development in the industry, with a view to broader knowledge of the result on the product and consequently safer pressure vessels.

It is with great interest that the Committee reports the adoption of the Boiler Code by Mexico. Request for permission to adopt the Boiler Code came as the result of a disastrous boiler explosion in Mexico about a year ago. Credit is to be given to the Society as the source of the Code adopted.

Several new appointments have been made: F. G. Straub, Shepard T. Powell, H. J. Kerr and John A. Hunter appointed members of the Sub-

committee on Rules for the Care of Steam Boilers. The resignations of E. G. Bailey, W. G. Diman, J. W. Hays, and J. S. Schumaker as members of the Subcommittee on Rules for the Care of Power Boilers were accepted.

Mr. LeRoy Mikels has been appointed a member of the Boiler Code Committee to fill the vacancy caused by the resignation of Thomas E. Durban. Honorary membership on the Boiler Code Committee has been conferred upon Thomas E. Durban, William F. Kiesel, Jr., and H. H. Vaughan.

The Committee reports with regret the death of S. W. Miller, one of the valued members of the Subcommittee on Welding and on Unfired Pressure Vessels. Mr. Miller was prominently associated with these subcommittees and was an authority on the subject of welding. He passed away on February 3, 1929.

REPORTS OF MEETINGS

REPORTS OF MEETINGS

THE following pages present brief reports of meetings of the Society and of its Professional Divisions during 1929. Reference should be made to *Mechanical Engineering* and the *A.S.M.E. News* for more detailed accounts. The meetings reported here are as follows:

Meetings of the Society

Knoxville, Tenn., March 21-23, 1929
Rochester, N. Y., May 13-16, 1929
Semi-Annual, Salt Lake City, Utah, July 1-4, 1929
Akron, Ohio, October 21-23, 1929
Annual, New York, N. Y., December 2-6, 1929

Meetings of the Professional Divisions

Aeronautic, St. Louis, Mo., May 27-30, 1929
Aeronautic, Cleveland, Ohio, August 31, 1929
Fuels, Philadelphia, Pa., October 7-10, 1929
Iron and Steel, Cleveland, Ohio, September 11-13, 1929
Machine Shop Practice, Cleveland, Ohio, September 30–October 4, 1929
Materials Handling and Management, Detroit, Mich., May 1-3, 1929
Oil and Gas Power, State College, Pa., June 24-27, 1929
Printing Industries, New York, N. Y., February 7, 1929
Printing Industries, Pittsburgh, Pa., November 7-8, 1929
Railroad, State College, Pa., June 21, 1929
Textile, Lowell, Mass., May 17, 1929
Wood Industries, Rockford, Ill., October 16-18, 1929

MEETINGS OF THE SOCIETY

Knoxville Meeting

Knoxville, Tenn., March 21-23, 1929

The A.S.M.E. Meeting held at Knoxville, Tennessee, with headquarters at the Farragut Hotel, on March 21, 22, and 23, 1929, offered a splendid opportunity for the mechanical engineers of the country to become acquainted with the tremendous industrial and engineering progress that is being made in the South. The program of papers revealed recent advances in engineering practice, and the many mod-

ern industrial plants which were visited demonstrated how these advances have been put into practice.

One hundred and ninety registered for the meeting, and all sections of the South were well represented. During the entire three days of the meeting the Association of College Engineers, a group of students throughout the South, met simultaneously. Student delegations were present from the Georgia School of Technology, Clemson Agricultural College, Washington University, St. Louis, University of Florida, Vanderbilt University, Virginia Polytechnic Institute, and North Carolina State College of Agriculture and Engineering. These students joined in the technical sessions and industrial excursions, and provided part of the program on Friday afternoon, March 22, when all those attending the meeting were invited to witness the ceremony of Knighting the followers of St. Patrick, the patron saint of the engineers. This ceremony, which took place on the campus of the University of Tennessee, is an annual celebration of the Association of College Engineers (formerly known as the Order of the Knights of St. Patrick), at which seniors who have worked for the advancement of the organization during their years in college are made Knights.

Technical Sessions

At the first technical session on Thursday morning Dean C. E. Ferris, chairman of the local committee for the meeting, introduced the officers of the Society who were present. He then presented the mayor of Knoxville, J. A. Fowler, and C. F. Holland, executive vice-president of the Knoxville Chamber of Commerce, who extended a welcome on behalf of the city.

The papers presented at this and other sessions were as follows:

Thursday Morning, March 21

Some Factors of Furnace Design, F. C. Stewart
Design of the Gorgas Steam Power Plant of the Alabama Power Company, John M. Gallalee
Use of Powdered Fuel in Standby Stations, H. H. Bailey

Thursday Afternoon, March 21

Training Junior Executives for the Printing Industry, E. W. Palmer
Modern Practice in the Quarrying and Milling of Marble, J. P. McCluskey

Thursday Evening, March 21

Combined Stresses in Thick-Walled Cylinders (*Read by Title*), E. B. Norris
The Domestic Fuel Problem as Modified by Low-Temperature Carbonization, Geo. A. Orrok

Low-Temperature Carbonization of Southern Appalachian Coal, Leo Holdredge

Friday Morning, March 22

Relation of Development of a City to that of Surrounding Region. James Arentsen

Resources of the Southeastern Appalachian Slopes, J. K. Marquis and S. B. Earle

The Survey of the Tennessee River System by the Corps of Engineers, U. S. A., J. A. Switzer

Friday Afternoon, March 22

New Departures in the Drawing of Thin Seamless Tubing, W. M. Fulton

Excursions

The sessions on Thursday were followed by trips to the Knoxville Filtration Plant, a modern pumping plant for the city's water supply, and to the marble quarries and mills near Knoxville. Here in this territory is the third largest marble-producing area in the world, turning out the famous Tennessee marble. To many of those who were unfamiliar with the industry, this trip was especially interesting. At the quarry the channeling machines which cut out huge blocks of marble were seen in operation. At the mills the operations of gang-sawing, polishing, and hand carving were inspected.

On Friday morning there were inspection trips to the American Zinc Company mine and ore mill, at Mascot, to the reduction plant of the Aluminum Company of America, at Alcoa, and the aluminum rolling mill of its subsidiary, the United States Aluminum Company.

The session on Friday afternoon was held at the plant of the Fulton Sylphon Machine Company, and then those attending were shown through the works, which is the largest factory in the world devoted to the manufacture of temperature and pressure-control instruments.

Saturday was given over to automobile trips to the Great Smokies and a special excursion to Kingsport, Tenn., where are found plants of the Tennessee Eastman Corporation, the Mead Fiber Co., Borden Mills, Kingsport Hosiery Mills, Kingsport Brick Corporation, Pennsylvania-Dixie Cement Corporation, the Holliston Mills, and the Kingsport Press, perhaps the most interesting of all. It is said to be the largest book printing and binding plant in the world.

Entertainment

On Thursday evening a quartet from Knoxville College rendered a group of negro spirituals.

The banquet on Friday evening was planned and conducted by students at the University of Tennessee. The toastmaster of the evening was George Abernathy. Dr. H. A. Morgan, president of the University, welcomed the guests. J. S. Queener, president of the Council of the Association of College Engineers, brought greetings from the students to the meeting.

The main addresses of the evening were made by Ralph E. Flanders, a Manager of the Society, and L. W. Wallace, executive secretary of the American Engineering Council. Mr. Flanders discussed the beauty, truth, and spirit of various civilizations, developing the theme that modern engineering supports these three elements in our modern machine civilization. Mr. Wallace gave an analysis of the roster of "Who's Who," in which he said that engineers as a class were well represented. Dancing at Jefferson Hall followed the speaking program.

Ladies' Events

Special events for the ladies included an automobile trip about Knoxville, followed by tea at the Holston Hills Country Club, on Thursday afternoon, a bridge at the Farragut Hotel in the evening, and a trip to the Clinton Hosiery Mills, at Clinton, Tenn., one of the largest in the country devoted exclusively to the making of full-fashioned hosiery, on Friday morning.

Rochester Meeting

Rochester, N. Y., May 13-16, 1929

More than 500 members of the Society and their guests enjoyed the hospitality of the Rochester Section at the meeting held in that city, May 13 to 16, 1929. With headquarters at the Sagamore Hotel and the use of the Auditorium of the Rochester Gas & Electric Co. immediately next door for the larger audiences, space was provided for fifteen technical sessions and numerous committee meetings and luncheons as well as meetings of Council and of the Society's Nominating Committee. This was the first meeting of the Society in New York State, outside of New York City, since the Buffalo meeting in 1915.

Council and Committee Meetings

During the first two days of the meeting, the Council of the Society was in session, largely concerned with balancing its budget and receiving reports of its standing committees. Detroit was announced as the scene of the 1930 Spring Meeting, and a group from Akron met with the Meetings and Program Committee to formulate plans

for the meeting to be held there in the autumn. Numerous other committees chose this time for getting together. So extensive was this activity that some of the Standards Committees held over until Friday in order to find time to accomplish their work.

On Tuesday noon the Council met with the Local Sections delegates for luncheon. President Sperry was present and addressed the luncheon, telling of the breakfast to which Mr. George Eastman had invited him and the members of the Council.

Technical Sessions

The majority of the technical sessions were confined to the mornings, leaving the afternoons free, after the first day, for excursions to industrial plants in the vicinity, and for entertainment events arranged by the Local Committee. The program of technical papers follows:

Monday Morning, May 13

Boiler Furnace Refractories

(Auspices of Special Research Committee on Boiler Furnace Refractories)

A Laboratory Slagging Test for Boiler-Furnace Refractories, R. K. Hursh

A Study of Crystalline Compounds Formed in Slags on Boiler-Furnace Refractories, T. A. Klinefelter and E. P. Rexford

Study of some Factors in Removal of Ash as Molten Slag from Powdered-Coal Furnaces, Ralph A. Sherman, P. Nicholls, and Edmund Taylor

Evolution of the Slag-Tap Furnace at the Charles R. Huntley Station of the Buffalo General Electric Company, H. M. Cushing

Present Status of Tests for Refractories, Stuart M. Phelps and J. Spotts McDowell

Proprietary Air-Cooled Refractory Walls, Charles S. Gladden

Monday Afternoon, May 13

Boiler Feedwater Studies

(Auspices of Joint Research Committee on Boiler Feedwater Studies)

The Formation and Thermal Effects of Calcium Sulphate Boiler Scale, Everett P. Partridge and Alfred H. White

Control of Boiler-Water Treatment to Prevent Embrittlement, Frederick G. Straub

Education and Training

(Auspices of Committee on Education and Training for the Industries)

The Technical Institute—European Examples and Their Significance for American Education, W. E. Wickenden

Industry Specifies its School Training Needs, Virgil M. Palmer

The British Apprenticeship Report and Its Value to American Industry, William S. Conant

Applied Mechanics (I)

(Auspices of Applied Mechanics Division)

Calculation of Flywheels for Air Compressors, H. R. Goss and H. V. Putman
Vibration Damping, Including the Case of Solid Friction, A. L. Kimball

Tuesday Morning, May 14

Heat Transmission

(Auspices of Fuels Division)

Heat-Insulation Practice in the Modern Steam-Generating Plant, L. B. McMillan
Surface Heat Transmission, R. H. Heilman

Machine Shop Practice (I)

(Auspices of Machine Shop Practice Division)

Five-Minute Talk on Safety, J. H. Norton
Economies which May Be Effected in Power Transmission, W. W. Nichols
Diamonds as Metal-Cutting Tools, C. L. Bausch
Tungsten-Carbide Cutting Tools, Henry J. Long and W. Paul Eddy, Jr.
Present Status of Tungsten Carbide as a Cutting Material—Report of Subcommittee on Machinability of Special Research Committee on Cutting of Metals, Frank C. Spencer

Applied Mechanics (II)

(Auspices of Applied Mechanics Division)

The Teaching of Advanced Mechanics in Engineering Schools, S. Timoshenko
Advanced Mechanics in the Electrical Industry, J. Ormondroyd

Wood Industries

(Auspices of Wood Industries Division)

Five-Minute Talk on Safety, C. H. Thompson
Manufacturing Library and Office Furniture, D. J. McLaughlin
Manufacturing Upright and Grand Piano Cases, Jos. T. Lindsey
Conservation of Lumber in Woodworking Plants, Carl M. Bigelow
Progress Report of Special Research Committee on Saws and Knives, Carle M. Bigelow

Wednesday Morning, May 15

Economizers and Preheaters

(Auspices of Power Division)

Design and Proportions of Economizers and Air Preheaters, Hosea Webster

Machine Shop Practice (II)

(Auspices of Machine Shop Practice Division)

Thread Forms of Milled Worms—Progress Report of Special Research Committee on Worm Gears, EARLE BUCKINGHAM
Large Spiral Bevel and Hypoid Gears, ALLAN H. CANDEE

Materials Handling

(Auspices of Materials Handling Division)

Five-Minute Talk on Safety, C. B. AUEL
Selective Package Conveyors, W. O. HILDRETH
Handling Papers and Small Articles by Pneumatic Tubes, JAMES WHITING

Thursday Morning, May 16

Equipment for Creep Tests

(Auspices Joint Research Committee on Effect of Temperature on the Properties of Metals)

A Machine for Making Creep Tests at High Temperatures, GLEN D. BAGLEY

Management

(Auspices of Management Division)

Controlling the Manufacture of Parts on Order and for Stock by the Gantt Progress Chart, DAVID B. PORTER
The Synchronization of Sales and Production, HOWARD M. HUBBARD

Surges in Pump Discharge

The Occurrence and Elimination of Surge or Oscillating Pressures in Discharge Lines from Reciprocating Pumps, H. DIEDERICHS and W. D. POMEROY

Mechanical Springs

(Auspices of Special Research Committee on Mechanical Springs)

A New Type of Air Spring, JOSEPH KAYE WOOD

EXCURSIONS

Special inspection trips were arranged to the Kodak Park Works of the Eastman Kodak Co.; the Bausch & Lomb Optical Co.; the Garlock Packing Co. of Palmyra; the Gleason Works, makers of gears and gear-cutting machinery; the Todd Co., check protectors; The Stromberg-Carlson Telephone Manufacturing Co., telephones and radio; the General Railway Signal Co.; the Taylor Instrument Companies, thermometers, etc.; the Hickey-Freeman Company,

men's clothing; and Bastian Bros. Co., makers of class pins, emblems, and similar specialties.

The following plants, while not scheduled for special excursions, were open for inspection: Rochester Gas & Elec. Corp.; Pfaudler Co., manufacturers of glass-lined tanks; Stecher Lithographic Company; Ritter Dental Mfg. Co.; American Laundry Machinery Company; Yawman & Erbe Mfg. Co.; the Seneca Falls Mfg. Co., at Seneca Falls, N. Y.; The Symington Company; and the North East Electric Company.

Entertainment

At the invitation of Miss Kate Gleason, Life Member of the Society, the Informal Get-Together was held at her Moorish Villa, "Clones," on Monday afternoon and evening. A steak supper in charge of the Food Administration Department of the Rochester Mechanics Institute, was served. A program of music by a male quartette, movies, and cards, was followed by dancing. Miss Gleason's home, in which extensive alterations were made to accommodate the guests, and her large estate provided a charming setting for an unusually enjoyable gathering.

The Banquet

Tuesday evening was the occasion of the formal dinner held in the Roof Garden of the Sagamore Hotel. The Hon. Stephen B. Storey, City Manager of Rochester, acted as toastmaster. President Sperry spoke appreciatively of what Rochester had done for the Society in holding a great meeting in its industrial atmosphere.

The chief speaker was Dr. C. E. V. Mees, director of the research laboratory, Eastman Kodak Co. His subject was "What Really Matters," and in his brilliant presentation of it he showed how events which had been of great concern to those who lived contemporaneously with them failed to affect permanently or change in any important degree the history of progress, while the means by which the entire character of civilization has many times been changed have made no stir at the time of their discovery and have been unappreciated by those who were alive to witness them.

Speaking extemporaneously, Mrs. Lillian Gilbreth, also a member of the Society, paid a warm tribute to Rochester which has successfully proved that a manufacturing community can retain a sense of æsthetic values. At the completion of the dinner, dancing followed until a late hour.

ILLUSTRATED LECTURE BY MYRON A. LEE

On Wednesday night, in the ball room of the Hotel Seneca, an illustrated public lecture was given by Myron A. Lee on decoration and proportion in manufactured goods. By means of a group of lantern slides, Mr. Lee showed examples of the evolution of many of our modern machines, such as the automobile, the sewing machine, the typewriter, and pointed out the gradual emergence of designs which combined the elements of beauty, utility, and good taste and eliminated forms and unnecessary ornamentation. C. Storrs Barrows, Vice-President of the Rochester Engineering Society and President of the Rochester Society of Architects, presided at the meeting.

PROGRAM FOR THE LADIES

Following a luncheon at the Sagamore Hotel on the first day of the meeting, the ladies made a motor trip through Genesee Valley Park, terminating at the home of Miss Gleason in time for the Get-Together. Tuesday morning was devoted to a shopping tour, with luncheon at the Columbus Club. In the afternoon there were excursions to Kodak Park and the Museum at Edgerton Park. Wednesday morning also was given over to shopping, followed by luncheon and bridge at the Hotel Seneca. A motor tour on Thursday morning touched Maplewood Park, Driving Park Avenue Bridge and the Lower Falls of the Genesee, Seneca Park, Summerville Boulevard, Durand-Eastman Park, Irondequoit Bay and Inspiration Point, and was followed by luncheon at the Blarney Stone Inn. In the afternoon there was a showing of Kodacolor films in the Little Theatre and tea at the Memorial Art Gallery. The program of evening events coincided with that for the men.

Semi-Annual Meeting

Salt Lake City, Utah, July 1-4, 1929

The Semi-Annual Meeting of the Society, held at Salt Lake City, Utah, July 1 to 4, 1929, was enjoyed by nearly two hundred members of the Society and their guests. The program as outlined furnished a very nicely balanced combination of technical sessions, inspection trips, and social activities, and the visitors were treated to some new and novel experiences which were greatly appreciated. The convention was fortunate in being allowed to use the palatial President's Suite at the Hotel Utah for its headquarters.

National Parks Tour

The activities of the week began with the arrival early Monday morning of the special train of the Six National Parks Tour. This group left New York on June 17, and had visited Chicago, Fort Collins, and the Rocky Mountain National Park, Grand Canyon, Zion National Park, and Bryce Canyon before reaching Salt Lake City. Following the Semi-Annual Meeting it proceeded northward to Yellowstone Park, and then through Great Falls and Butte to the Glacier National Park. The trip terminated at New York on July 16.

A business meeting preceded the technical session Monday morning, and the Council and several committees convened during the meeting.

Three technical sessions, as follows, were held.

Monday Morning, July 1

Recent Developments in Air Transport, Philip C. Johnson

Modern Practice in the Installation and Starting of Hydroelectric Units, Charles V. Foulds

Tuesday Morning, July 2

Ore Handling at the Utah Copper Company's Mine and Mills, H. C. Goodrich

Wednesday Morning, July 3

Recent Developments in the Mechanical Loading of Coal in Mine Cars, O. G. Sharrer

Salt Lake City's Fuel and Smoke Problem, Geo. A. Orrok and W. H. Trask, Jr.

Excursions and Entertainment

The remainder of the program consisted of entertainment and excursion features.

The ladies were shown through the Administration Building of the Mormon Church, the Bee Hive House and the Lion House on Monday morning. This was followed by a luncheon at the Hotel Utah for the ladies, paralleling a luncheon at the Chamber of Commerce at which the hosts were the Chamber of Commerce and the Engineering Council of Utah. During this luncheon a telegram of greetings was received from President Hoover. Col. Paul Doty, a manager of the Society, gave an address, taking as his subject " The Engineer as a Community Asset."

In the early afternoon about one hundred and fifty of the visitors went by motor bus to inspect the Salt Lake Airport and then continued on to the Great Salt Lake where most of them enjoyed the

interesting experience of bathing in a saturated solution of salt water, in which they could not sink. After dinner there was dancing until time for the bus ride back to the city.

"UTAH COPPER DAY"

Tuesday might have been called "Utah Copper Day" as most of the activities were concerned with this greatest of all open-cut copper mines. At the conclusion of the technical session the group went by motor bus to the copper mine at Bingham, Utah. There they saw the working of twenty-seven steam shovels and all of the train switching necessary to handle the great tonnage of ore. After luncheon they visited the concentrating mills and finally the smelter, so that during the course of the trip the ore was followed from its place in the ground to the blister copper.

"EXTRALATERAL SIGHT-SEEING" AT BANQUET

Tuesday evening was reserved for the banquet. Favors were given to those present as souvenirs, the ladies receiving a burned-copper napkin ring and the men a blistered-copper match stand. Mr. Trask introduced the toastmaster, George M. Bacon, president of the Engineering Council of Utah and State Engineer, who welcomed the delegates on behalf of the Governor. His address was pleasingly replied to by Past-President W. L. Abbott. The surprise of the evening, listed as "extralateral sight-seeing," consisted of the showing of an exquisite set of colored lantern slides, covering many of the places visited by those on the parks tour as well as other interesting western scenery, and explained in delightful fashion by Dr. J. E. Broaddus.

At the conclusion of the session on Wednesday the delegates and ladies were special guests at an organ recital in the great Mormon Tabernacle, after which they were conducted through the building and around the historic grounds by L. E. Young, professor of western history at the University of Utah. The day was ended with a sight-seeing trip and a reception to the ladies given by Mrs. Dern, the wife of Governor George H. Dern.

VISIT TO OGDEN CANYON

Thursday was spent in Ogden Canyon, one of Utah's most beautiful spots. Luncheon was served at the Hermitage Inn, and then the large artesian wells which supply the city of Ogden with water were visited. At nine o'clock in the evening the special train left for Yellowstone National Park, officially ending the convention.

Akron Meeting

Akron, Ohio, October 21-23, 1929

Under the unfavorable conditions of a rainstorm which persisted throughout three days of sessions, the Akron Section of the A.S.M.E. acted as host to the Society at its meeting, October 21 to 23, 1929. A program of eight technical sessions and five interesting excursions, with a banquet at which 86 were present, and a smoker at the Firestone Club, at which 140 sat down to dinner, drew an attendance of 336 registrants. The Hotel Portage was headquarters for the meeting.

The Council of the Society convened on the first day of the meeting, and at a conference following the Management Session on October 23 the Elimination of Waste Committee decided that it would hold a session in Chicago on March 4, 1930, at the time of the Industrial Equipment Exhibition, and that this session would be in cooperation with the National Management Congress to be held that week at the Hotel Stevens in Chicago.

Technical Program

The titles and authors of the papers presented at the Akron meeting are given in the following summary of the technical program.

Monday Morning, October 21

Materials Handling (I)

(Auspices of Materials Handling Division)

Materials Handling in the Plant of the Goodyear Tire and Rubber Company, C. C. Stuber

Fundamentals which Should Be Observed in Design and Application of Tramrail Systems, E. T. Bennington

Education and Training for the Industries

(Auspices of Committee on Education and Training for the Industries)

Apprenticeship in the Rubber Industry, C. C. Slusser

Applied Mechanics

(Auspices of Applied Mechanics Division)

Turbine Vibration and Balancing, Thomas C. Rathbone

Stresses and Deflections in Flat Circular Plates with Central Holes, A. M. Wahl and G. Lobo, Jr.

Tuesday Morning, October 22

Aeronautics

(Auspices of Aeronautic Division)

Rubber in Airplane Construction, C. Saurer
Airplane Tires and Wheels, H. F. Schippel
Akron's Contribution to Aeronautics, Hugh Allen
Some Fundamental Economics of Aircraft Operation, R. H. Upson

Materials Handling (II)

(Auspices of Materials Handling Division)

Incentive Payment Plans for Material Handling, C. A. Fike
Conveying in Tire and Rubber Factories, F. E. Moore

Wednesday Morning, October 23

Power

(Auspices of Power Division)

Power and Heat in the Industrial Plant, R. J. S. Pigott

Management

(Auspices of Management Division)

National Elimination-of-Waste Campaign, C. B. Auel
Organizing a War on Waste, Raymond Chalmers and W. E. Roe

Iron and Steel

(Auspices of Iron and Steel Division)

Billet Chipping, Robert S. Haydock
Recent Development in the German Iron and Steel Industry, W. Trinks

Excursions

In spite of the rain, the excursions were well attended.

On Monday afternoon Plants 1 and 2 and the power house of the Firestone Tire & Rubber Co. were visited. Arrangements had been made to show the making of tires and tubes in detail, and also the manufacture of molded goods, automobile tire rims and batteries. The trip ended at the Firestone Club House for the dinner and smoker.

The excursions on Tuesday began at Plant No. 1 of the Goodyear Tire & Rubber Co., Inc., where the entire party were guests at luncheon served in the company's cafeteria. From here buses transported everyone to the air dock of the Goodyear-Zeppelin Corporation, under construction. This building, the largest single structure

in the world, will be 1200 ft. long, 200 ft. high, and 325 ft. wide. A demonstration of the opening and closing of one of the enormous doors, weighing nearly 600 tons and providing an opening 180 ft. high and 240 ft. wide at the bottom, was given.

Returning from the air dock, the party inspected Plant No. 2 of the Goodyear Tire and Rubber Co., Inc., in which rubber heels, hose, and belting were being made.

Wednesday afforded three popular excursions, one to the Timken Roller Bearing Co.'s plant at Canton, Ohio, when the electric steel plant, as well as the automatic-screw machine and assembly plants were inspected. The Babcock-Wilcox Co. were hosts at Barberton, Ohio, for an inspection of their boiler-manufacturing plant; the Ohio Insulator Company gave a demonstration of 5,000,000-volt insulators, and showed the manufacture of high-tension electric insulators. The other plant visited was that of the B. F. Goodrich Co., of Akron. Here were witnessed the processing of rubber and the manufacture of rubber boots and shoes.

Other companies in Akron and vicinity also opened their shops for the convenience of visitors who wished to take this opportunity of seeing the city's industries. Among these were:

Miller Rubber Company
N. O. P. & L. Gorge Power Plant and Beech Street Steam Heating Plant
American Vitrified Products Company
Akron Pure Milk Company
National Rubber Machinery Company
General Tire & Rubber Company
Imperial Electric Company
Robinson Clay Products Company
Star Drilling Machine Company
Taplin-Rice-Clerkin Company
India Tire & Rubber Company, Mogadore, Ohio
Seiberling Rubber Company, Barberton, Ohio
Pittsburgh Valve & Fittings Company, Barberton, Ohio
Ohio Injector Company, Wadsworth, Ohio

Social Events

The coincidence of the Edison celebration at Dearborn falling on the same night as the Smoker at the Firestone Club House robbed the program of a notable speaker, Harvey Firestone, Jr., who was to have given an address on "Rubber Plantation Development." As it was, the members and their guests were privileged to hear the exercises at Dearborn broadcast. E. A. Hoener, assistant superintendent of engineers, Firestone Tire & Rubber Co., acted as toastmaster. Fred E. Swineford, director of the department of public service, City of Akron, delivered the address of welcome in the absence of the mayor of the City. Paul Wright, of Birmingham, Ala-

bama, vice-president of the Society, responded on behalf of the Council and members of the Society and expressed the thanks and appreciation of those present and of the officers of the Society for the hospitality of the Akron Section. These brief speeches were followed by a program of singing and professional dancing.

The banquet at the Hotel Portage on Tuesday night afforded President-Elect Charles Piez an opportunity of addressing the Society. E. A. Muller, as senior vice-president, represented President Sperry and expressed Dr. Sperry's regret at being unable to be present in person. He then introduced the very able toastmaster, Dean Fred E. Ayer, of Akron University. President-Elect Charles Piez dealt with three subjects in his address; the status of the engineer in industry, the question of the decentralization of the Society, and the licensing of engineers. Dr. W. E. Wickenden, president of the Case School of Applied Science, was the second speaker and voiced an appreciation of Thomas A. Edison's work as an inventor, pointing out how the process of invention has changed through the organization of scientific research. In expressing his disappointment that F. A. Seiberling, president of the Seiberling Rubber Co. was unable to be present and give the third address, Dean Ayer paid a sincere tribute to an honored citizen of Akron.

Ladies' Program

While only sixteen ladies registered for the meeting they were enjoyably entertained by the local committee headed by Mrs. Hal K. Jennings. They had an excursion schedule of their own which included automobile rides and trips to the Quaker Oats plant, and the Hoover Company plants at North Canton. They also participated in the Goodyear-Zeppelin excursion.

Annual Meeting

New York, N. Y., December 2-6, 1929

With an attendance of 2215 the Society brought to a successful close on Friday, December 6, its fiftieth Annual Meeting. Members and guests traveled from all parts of the United States to attend this event, and there were registered also visitors from England, France, Germany, Italy, Japan, South America, and Turkey.

Local Sections Conferences

The meeting began on Sunday afternoon, December 1, with a conference of Local Sections' delegates. Inasmuch as the year 1929 marks the twenty-fifth anniversary of the founding of the first Local

Section of the Society at Milwaukee, the occasion was one of more than usual significance. Of the 71 Local Sections, representatives were present from 66. The five Sections whose delegates found at the last moment that they could not be present to represent their groups were West Virginia, Memphis, Syracuse, Chattanooga, and Akron. The representative of the only Section formed during the past year, St. Joseph Valley, C. C. Wilcox of South Bend, Ind., took a prominent part in the Conference.

On Sunday afternoon Chairmen of several Standing Committees addressed the Conference, outlining the activities of the Society which come under their supervision and emphasizing ways whereby the Local Sections might cooperate to further national activities. The speakers included Prof. W. A. Shoudy, representing the Committee on Publications; Prof. S. W. Dudley, Chairman of the Committee on Meetings and Program; Archibald Black, Chairman of the Committee on Professional Divisions; Dean C. P. Bliss, Chairman of the Committee on Standardization; Prof. A. E. White, Chairman of the Committee on Research; and Dean A. A. Potter, Chairman of the Committee on Relations with Colleges.

Two committees of the Conference were appointed, one to discuss with the Committee on Relations with Colleges the problems of the Student Branches. This committee brought in resolutions adopted by the Conference recommending that the Council of the Society give careful consideration to the importance of the Student Branches and their value to the Society, and that more liberal financial support be granted the Committee on Relations with Colleges, so that the Student Branches may serve the Society and the engineering profession more effectively.

The other Committee devoted its attention to a recommendation which was also later adopted by the Conference, that the Professional Divisions give their attention to the development of a new Division of the Society to care for the activities of those members of the Society who are engaged in the chemical industries and other vocations involving processes of manufacture.

After a dinner at the Engineers' Club the delegates divided into their respective group meetings during the evening to select the following members and alternates of the National Nominating Committee for the ensuing year:

Group I — Ralph Earle, Worcester, Mass; S. W. Dudley, New Haven, Conn., *Alternate*

Group II — Vincent M. Frost, Newark, N. J.; W. W. Macon, New York, *Alternate*

Group III — Walter F. Dixon, Elizabethport, N. J.; E. C. Magdeburger, Washington, D. C., *Alternate*

Group IV — Eugene W. O'Brien, Atlanta, Ga.; Thomas Allen, Memphis, Tenn., *First Alternate;* J. M. Foster, Raleigh, N. C., *Second Alternate*

Group V — C. S. Robinson, Youngstown, Ohio; J. H. Herron, Cleveland, Ohio, *Alternate*
Group VI — John Hunter, St. Louis, Mo.; Max Toltz, St. Paul, Minn., *Alternate*
Group VII — S. H. Graf, Corvallis, Oregon; A. H. T. Williams, Portland, Oregon, *First Alternate;* F. G. Baender, Corvallis, Oregon, *Second Alternate*

These recommendations of the Conference were presented at the Business Meeting on Monday evening and formally approved.

The Conference of Local Sections' Delegates continued through Monday and Tuesday and considered many problems of importance to the engineer and the affairs of the Society.

The Conference devoted a good deal of time to the discussion of the Record and Index and Transactions, and made certain suggestions which were brought directly before the Committee on Publications by Prof. C. A. Herrick, who was appointed by the Conference to especially represent them for this purpose.

Some of the other items which the delegates discussed were: How the Sections could help in the development of plans for the Fiftieth Anniversary meeting of the Society and the possible holding of simultaneous meetings by each of the Local Sections; the desirability of the Local Sections holding meetings to discuss the 13-month calendar; the matter of affiliation or closer contact with engineers' clubs and the local sections of other engineering societies in the same cities; and how to develop the Local Section meetings for greater interest and attendance on the part of the membership generally.

The matter of membership development was discussed and it was decided that generally the most dignified procedure for the Society was for each Local Section to encourage its members in their individual capacity to invite their friends and associates in the engineering profession to make application for membership. The names of prospective members should be sent to the Chairman of each Local Section.

LICENSING AND REGISTRATION OF ENGINEERS

The session on Tuesday was devoted to discussion of the licensing and registration of engineers. The committee appointed by the 1928 Conference to study this subject made its report, following which there were addresses by representatives of a number of organizations that had been invited to contribute to the discussion. The result of the day's conference was the passing of a resolution to the Council requesting that it appoint a separate Committee on Registration to cooperate with similar committees of the other Founder Societies, and with the existing Committee on the Economic Status of the Engineer, and other interested organizations; this Committee

on Registration to coordinate the efforts of the various Local Sections to draft a uniform bill, and to have sufficient authority and freedom of action.

Special Luncheon and Dinner Meetings

On Monday noon of the Annual Meeting the usual Council-Local Sections Delegates luncheon was held. In the absence of President Sperry, senior Vice-President E. A. Muller welcomed the delegates and was followed by Charles Piez, President-Elect, who exhibited keen interest in the Local Section movement.

The Committee on Local Sections held its annual Reunion Dinner on Monday evening. It is customary each Annual Meeting Week for former members of this committee to meet with the present committee and in this way maintain interest in this important activity.

An informal Dinner of the executive officers of the Society with representatives of the Professional Divisions took place at the Beaux Arts Restaurant Monday evening, the Council met with the Student Branch delegates for luncheon at the Fraternity Clubs Building on Wednesday, and the Honorary Chairmen of the Student Branches held a luncheon on Thursday at the Fraternity Clubs Building.

Council Meetings

The Council of the Society met on Monday. Because President Sperry was absent (both he and Mr. Rice, Secretary, being on the way home from the World Engineering Congress in Tokyo, Japan), Edward A. Muller, Vice-President, presided at the meeting. C. E. Davies, Acting Secretary in the absence of Mr. Rice, performed the duties of that office.

At the Friday meeting of Council, President-Elect Charles Piez, Chairman of the Board, Link Belt Co., Chicago, Ill., took office.

The Business Meeting

On Monday evening a business meeting of the Society was held in the Auditorium. Vice-President Muller presided. Mr. C. E. Davies, Acting Secretary, presented the annual report of Council and its standing committee. Dr. Ira N. Hollis, for the Committee on Awards, presented the candidates for Junior Award, A. M. Wahl, of the Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa., and for Student Awards, F. V. Bistrom and W. W. White, of the University of Washington, Seattle, Wash. Resolutions on the death of Worcester Reed Warner, Past-President and Honorary Member of the So-

ciety, were read by Dr. Hollis, following which the personnel of the Nominating Committee for 1930-1931 was announced.

Technical Sessions

The program was arranged so that technical sessions were held morning and afternoon of every day starting Monday and ending Friday. At these sessions, which numbered 27 in all, 59 technical papers and 13 reports were presented. The most largely attended session was that of the Power Division on Thursday morning. The program for this session contained a paper by C. F. Hirshfeld and G. U. Moran on "The Performance of Steam Generating Units," which was a report of a study made at the request of the Central Stations Committee of the A.S.M.E. Power Division. It contained data secured from daily operation logs for one year in some two hundred boilers in about sixty stations.

The customary joint meeting of the A.S.R.E. and the A.S.M.E. was presided over by H. D. Edwards, vice-president of the A.S.R.E.

The usual interesting afternoon devoted to steam tables research brought forth reports from Geo. A. Orrok, chairman of the Technical Subcommittee of the Research Committee on the Properties of Steam; Harvey N. Davis, who reported on the Steam Table Conference held in London in July, 1929; F. G. Keyes and L. B. Smith, who told of the work in progress at the Massachusetts Institute of Technology; N. S. Osborne, who spoke about the new determinations of latent heat from 100 to 250 deg. cent.; E. F. Mueller, whose paper discussed the passing of the mechanical equivalent of heat as a conversion factor; and R. C. H. Heck, who offered some notes and comments covering the methods of Jenkins and Pye for locating the liquid saturation line in the temperature-entropy chart, together with a comparison of formulations along adiabatic lines.

The Student Branch Conference was held on Wednesday afternoon with an attendance of 125, there being 46 delegates present from the Society's 96 Student Branches.

On Monday afternoon there was a public hearing on the test code for liquid fuels.

The Railroad Division had three sessions on the Annual Meeting program, as well as a joint session with the Oil and Gas Power Division. In 1928 the Division started an extensive development of its field and its sessions at this Annual Meeting were in the nature of a National Meeting of Railroad Engineers. A special circular was sent in advance of the meeting to its members and also to other well-known railroad engineers, inviting them to participate in the sessions

and calling attention to such other sessions as might be of importance to a railroad engineer.

Monday Morning, December 2

Hydraulic Power

(Auspices of Hydraulic Division)

Power — Steam or Hydro, or Both, WM. W. TEFFT
Increased Kilowatt Output of Adjustable-Blade Propeller Turbines, C. R. MARTIN
Mechanical Vibrations in Penstocks of Hydraulic Turbine Installations, J. P. DEN HARTOG

Applied Mechanics (I)

(Auspices of Applied Mechanics Division)

Factor of Safety and Working Stress, C. RICHARD SODERBERG
On the Mechanics of the Plastic State of Metals, A. NÁDAI

Monday Afternoon, December 2

Hydraulic Turbines

(Auspices of Hydraulic Division)

Changing Requirements in Hydraulic Turbine Speed Regulation, FORREST NAGLER
Mechanics of Hydraulic-Turbine Pressure Regulation, ARNOLD PFAU
Progress Report of Hydraulic Division, Presented for discussion by BRYON E. WHITE
Report of Committee on Survey of Hydraulic Research of Hydraulic Division (*Presented by title*)

Machine Shop Practice

(Auspices of Machine Shop Practice Division)

Quality Control and Production Gages, EARLE BUCKINGHAM
Progress Report of Machine Shop Practice Division, Presented by title by KENNETH H. CONDIT

Applied Mechanics (II)

(Auspices of Applied Mechanics Division)

Torsional-Vibration Dampers, J. P. DEN HARTOG and J. ORMONDROYD

Tuesday Morning, December 3

Fuels

(Auspices of Fuels Division)

Soot Particles in New York City Air, E. E. FREE
Progress Report of Fuels Division, Presented by J. T. WARD

Materials Handling

(Auspices of Materials Handling Division)

The Application of Aerial Tramways to Long and Short Hauls. M. P. Morrison

Progress Report of Materials Handling Division, Presented by Edwin D. Smith

Open Conference on Future Activities of Materials Handling Division

Applied Mechanics (III)

(Auspices of Applied Mechanics Division)

Natural Frequency of Gears, R. E. Peterson

The State of Stress in Full Heads of Pressure Vessels, W. M. Coates

Tuesday Afternoon, December 3

Cutting Metals

(Joint auspices of A.S.M.E. Sepcial Research Committee on Cutting Metals and the Machine Shop Practice Division)

Five-Minute Talk on Safety, H. W. Mowery

Turning with Shallow Cuts at High Speeds, H. J. French and T. G. Digges

Power Required to Drill Cast Iron and Steel. O. W. Boston and Carl J. Oxford

Test Code for High-speed Steel for Turning Tools (Report of Research Subcommittee "D" on Properties of Materials), Lewis H. Kenney

Present Practice in the Use of Cutting Fluids (Report of Research Subcommittee on Cutting Fluids), Compiled by S. A. McKee.

Economics of Delivery Vehicles

(Auspices of Materials Handling Division)

Economic Aspects of Gasoline-Operated Commercial Vehicles, R. E. Plimpton

Symposium on the Economics of Delivery Service and Trailers, led by Hugh Forman, L. A. DeMore, and W. G. Retzlaff.

Mechanical Springs

(Auspices of A.S.M.E. Special Research Committee on Mechanical Springs)

The Radially Tapered Disk Spring, W. A. Brecht and A. M. Wahl

Present Status of the Mechanical-Spring Art, Joseph Kaye Wood

Elastic and Inelastic Behavior in Spring Materials (Report of Research Committee on Mechanical Springs), M. F. Sayre

Wednesday Morning, December 4

Department Management

(Auspices of Management Division)

Management of Service Departments — Budgeting and Wage Incentives Applied to a Large Organization, WILLIAM B. FERGUSON and TOM H. BLAIR

Lubrication

(Joint auspices of A.S.M.E. Special Research Committee on Lubrication and the Machine Shop Practice Division)

Performance of Oil-Ring Bearings, G. B. KARELITZ
Service Characteristics of Diesel-Engine Lubricating Oil, A. E. FLOWERS and M. A. DIETRICH

Use of Engineering Literature

What the Engineering Societies Library Does for Engineers, HARRISON W. CRAVER
The Value of Engineering Periodical Literature, J. E. HANNUM

Wednesday Afternoon, December 4

Education and Training for the Industries of Non-College Type

(Auspices of Committee on Education and Training for the Industries)

Summary of the study of Technical Institutes, W. E. WICKENDEN
Suggestions for Encouraging Education and Training for Industry, HAROLD S. FALK

Steam Tables Research

(Auspices of A.S.M.E. Special Research Committee on Properties of Steam)

Reports by GEO. A. ORROK, HARVEY N. DAVIS, F. G. KEYES and L. B. SMITH, N. S. OSBORNE, E. F. MUELLER, and R. C. H. HECK

Student Branch Conference

Possibilities in the Applications of Engineering to Plant Economy in Industrial Plants, A. A. ADLER
What is Ahead of the Engineering Graduate? W. A. HANLEY
Engineering in the Near East, L. A. SCIPIO

Thursday Morning, December 5

Production Management

(Auspices of Management Division)

Five-Minute Talk on Safety, A. J. VAN BRUNT
Advantages Derived from the Simplification of the Fundamental Formulas for Economic Production Quantities, FAIRFIELD E. RAYMOND
Twelve Years' Experience with Economic Production Quantities, C. H. BEST
Use of Economic Manufacturing Quantities, ROBERT W. KENT

Central-Station Power

(Auspices of Power Division)

Progress Report of Power Division, Presented by F. M. Gibson
Effect of Large Boilers at High Capacities on Operating Characteristics and Investment in Boiler Plants, Frank S. Clark
The Performance of Modern Steam-Generating Units, C. F. Hirshfeld and G. U. Moran

Railroad (I)

(Auspices of Railroad Division)

High-Pressure Locomotive Developments, A. F. Stuebing
Locomotive Auxiliary Power Mediums, George W. Armstrong
Progress Report of Railroad Division (*Presented by title*)

Oil and Gas Power

(Auspices of Oil and Gas Power Division)

Progress Report of Oil and Gas Power Division, Presented by E. C. Magdeburger
The Gas Engine and Its Application in Oil-Field Engineering, George L. Reid
Progress Report of Special Research Committee on Diesel Fuel Oil Specifications, Presented by Wiley H. Butler

Thursday Afternoon, December 5

Railroad (II)

(Auspices of Railroad Division)

Heat Transfer in the Locomotive Superheater, Lawford H. Fry
Alloy Steels in the Railroad Field, Charles McKnight

General Session

Working Stresses for Steel at High Temperatures, D. S. Jacobus
A Study of Tin-Base Bearing Metals — II, G. B. Karelitz and O. W. Ellis (Part I presented at Pittsburgh Meeting, 1928)

Fluid Flow

Symposium on the Application of Geometrical Similarity and Dimensional Analysis in Fluid Flow

(Auspices of A.S.M.E. Special Research Committee on Fluid Meters)

Quantity-Rate Fluid Meters, Ed S. Smith, Jr.
Similarity: Limitations in Its Application to Fluid Flow, J. M. Spitzglass
The Flow of Fluids through Orifices in Six-Inch Pipes, Samuel R. Beitler and Paul Bucher
Reports of the Subcommittees of the Fluid Meter Committee

Friday Morning, December 6

Boiler-Feedwater Studies

(Auspices of Joint Research Committee on Boiler-Feedwater Studies)

Recent Instances of Embrittlement in Steam Boilers, FREDERICK G. STRAUB

Aeronautics

(Auspices of Aeronautic Division)

Recent Developments in Aircraft Engines, JOHN H. GEISSE
Factors in the Design of Commercial Airplanes, CHARLES TALBOT PORTER
Progress Report of Aeronautic Division, Presented by E. E. ALDRIN

Textiles

(Auspices of Textile Division)

Five-Minute Talk on Safety, ARTHUR S. JOHNSON
Design and Operation of Range or In-Train Drives for Finishing Plants, WENDELL S. BROWN
Progress Report of Textile Division, Presented by MCREA PARKER

Friday Afternoon, December 6

Rail-Motor Cars

(Auspices of Railroad and Oil and Gas Power Divisions)

Design and Application of Rail Motor Cars, CHARLES O. GUERNSEY
Symposium on the Maintenance of Rail-Motor Cars, Led by ERNEST K. BLOSS

Refrigeration

(Joint Session with The American Society of Refrigerating Engineers)

The Constancy of Wet-Bulb Temperature and Total Heat Content during Adiabatic Saturation of Dry Air with Water Vapor (*Contributed by A.S.R.E.*), BARTON H. COFFEY
Engineering Computations for Air and Gases (*Contributed by A.S.M.E.*), SANFORD A. MOSS and CHESTER W. SMITH

Furniture Production

(Auspices of Wood Industries Division)

Five-Minute Talk on Safety, H. G. WIBERG
From the Master Cabinetmakers to Woodworking Machinery, J. D. WALLACE and MARGARET S. WALLACE
Modern Method of Manufacturing Classical Furniture, HARRY KIMP
Progress Report of Wood Industries Division, Presented by title by WM. BRAID WHITE

Many of the standing committees of the Society, executive committees of Professional Divisions, and subcommittees dealing with

the research, standardization, power test codes, and safety work were held. Among the special joint conferences held were the industrial power conference and luncheon, and the luncheon of the members of the Standardization Committee with the chairmen of standardization subcommittees on December 4; round table conference of the A.S.M.E. and A.S.T.M. on analysis and presentation of data, joint meeting of the Committees on Meetings and Program, Professional Divisions, and Local Sections, and dinner conference of the Research Committee with the chairmen of special research committees and the chairmen of the Professional Division Survey Committees on December 5; and the conference of the Elimination of Waste Committee of the Management Division with the American Management Association on December 6.

Social Events

"Open House"

Immediately after the Business Meeting on Monday evening the Open House social gathering took place. The Philadelphia Section brought to New York, under the able management of W. F. Oberhuber, the paraphernalia which for games of chance had been used at the Fuels Meeting in Philadelphia in October. Everyone was provided with paper money and was expected to risk this on horse and bicycle races, roulette, and other games. Those winning the greatest sums were rewarded with prizes of fountain pen and pencil sets. These winners were Philip W. Swain, M. A. Stone, C. R. Graves, and A. A. Adler.

President's Reception

Tuesday evening was the occasion of the President's Reception and Dance. Prior to the social gathering on the fifth floor, members and guests assembled in the auditorium. Edward Eyre Hunt, secretary of the Committee on Recent Economic Changes of the President's Conference on Unemployment, U. S. Department of Commerce, Washington, D. C., gave the first address of the evening. He was followed by L. W. Wallace, executive secretary of the American Engineering Council, Washington, D. C., who reported the findings which he and J. E. Hannum, editor of The Engineering Index Service of the A.S.M.E., had made in a study of the engineers listed in "Who's Who."

The tellers then reported the election of the following new officers for 1930:

President: Charles Piez
Vice-President: Paul Doty, Ralph E. Flanders, Ernest L. Jahncke, Conrad N. Lauer

Managers: Harold V. Coes, James D. Cunningham, Clarence F. Hirshfeld
Delegates to the American Engineering Council: L. P. Alford, Thomas D. Campbell, William B. Ferguson, Charles E. Ferris, John Lyle Harrington, William H. Kenerson, John H. Lawrence, Richard C. Marshall, Jr., Charles Piez, *ex-officio*, A. A. Potter

In acknowledging the applause which greeted the announcement of his election to the presidency of the Society, Mr. Piez spoke briefly of his plan to give a more active part in the administration of the Society's affairs to its vice-presidents. A reception to the new president and Mrs. Piez was then held in the lobby of the auditorium, after which there was dancing on the fifth floor.

FIFTIETH ANNUAL DINNER

Wednesday night was the occasion of the Fiftieth Annual Dinner of the Society, held at the Hotel Astor. Dr. Harvey N. Davis, president of Stevens Institute of Technology, acted as toastmaster. Seated with him were several of the Society's past presidents; the guest of honor, Dr. Oscar Von Miller, director of the Deutsches Museum, Munich, Germany; President-Elect Charles Piez; the speaker of the evening, President James Rowland Angell of Yale University; and the presidents of two sister societies, Col. R. I. Rees, of the S.P.E.E., and Prof. A. J. Wood, of the A.S.R.E. Past-President Abbott delivered the Charge to New Members which was received by them standing in their places after their names had been called by Acting-Secretary C. E. Davies. Dancing followed the dinner.

COLLEGE REUNIONS

The alumni of many of the leading technical colleges and universities held reunions during Annual Meeting week, the most of them occurring on Thursday evening.

Excursions

The cooperation of a number of companies was secured in planning and arranging a series of trips during the Annual Meeting. Excursions were made to the New York studios and offices, and WEAF Transmitter at Bellmore, L. I., of the National Broadcasting Company; Hell Gate Station of the United Electric Light and Power Company; East River Station of the New York Edison Company; plant of New York *Herald-Tribune;* Hotel New Yorker; Wright Aeronautical Corporation, Paterson, N. J.; Hudson Avenue Station of the Brooklyn Edison Company, Inc.; and Bell Telephone Laboratories Incorporated.

The National Power and Mechanical Engineering Exposition, more familiarly known as the National Power Show, was held at Grand Central Palace during the week of December 2.

Ladies' Program

Special events for ladies included an annual "Get-Together" on Monday evening; the sixth annual luncheon and annual meeting of the Woman's Auxiliary at the Hotel Astor on Tuesday, with a reception to new members and an address by Mollie Anderson Haley on "Art in Industry"; an informal reception and tea to Mrs. Richard S. Austin and Mrs. George L. Knight at the Engineering Woman's Club on Wednesday afternoon; the annual tea dance in the Engineering Societies Building on Thursday afternoon; and inspection trips to the Home Making Center at the Grand Central Palace, American Woman's Association Club House, and Ellis Island. Ladies were particularly invited to participate in the men's excursions to the studio of the National Broadcasting Company and the Bell Telephone Laboratories.

MEETINGS OF THE PROFESSIONAL DIVISIONS

Aeronautic Division

St. Louis, Mo., May 27-30, 1929

Commemorating the second anniversary of Lindbergh's Transatlantic flight, the Aeronautic Division held its Third National Meeting at St. Louis from May 27 to 30, 1929, under the auspices of the St. Louis Section. The program provided opportunities to witness racing and stunting, and to view exhibits of engines, planes, and accessories. Most satisfying of all from the standpoint of engineers was the program of technical papers. This substantial portion of the general activities presented a truly remarkable group of writers and a long list of topics so diversified in interest that all features of the industry and science were represented. The papers presented at the sixteen technical sessions were as follows:

Monday Morning, May 27

Opening Session

Address of Welcome, Victor J. Miller
Opening Address, Elmer A. Sperry
Air Transportation in Europe, C. S. (Casey) Jones

Monday Afternoon, May 27

Air Transport

Aircraft for Passenger Transport, C. N. MONTEITH
Organization of Passenger Air Transport (*Read by Title*), C. C. MOSELEY
Air-Mail and Express Traffic, R. W. IRELAND

Structural Analysis

Relative Merits of Various Types of Wing Structure in Monoplane Design, GEORGE W. DE BELL
Application of Advanced Methods to Airplane Structural Analyses, MICHAEL WATTER
Some Aircraft Structural Problems, LLOYD HARRISON

Diesel Engines

The Selection of an Airplane Engine, J. M. SCHOEMAKER
The Aircraft Diesel Engine, LEIGH M. GRIFFITH and EDW. T. VINCENT
Present Status of the Lightweight Diesel Engine for Aircraft Purposes, C. H. SCHOWALTER

Tuesday Morning, May 28

Lighter-than-Air Session (I)

The Application of the Principle of Least Work to the Primary Stress Calculations of Space Frameworks, CHARLES P. BURGESS
Some Aerological Principles Applying to Airship Design and Operation, F. W. REICHELDERFER
Airship Hangars and Hangar Doors, JOSEPH B. STRAUSS

Flight Training

Flying Schools and Flight Training, CLARENCE M. YOUNG
Modern Flight Instruction, TEX RANKIN
Modern Flying Schools Practices, OLIVER PARKS

Photography and Radio

Radio Developments Applied to Aircraft, J. H. DELLINGER and H. DIAMOND
Aerial Photography Engineering, E. R. POLLEY

Tuesday Afternoon, May 28

Lighter-than-Air Session (II)

Methods of Research in the Development of Lighter-Than-Air, W. B. KLEMPERER
The Production and Uses of Helium Gas, R. R. BOTTOMS

Airports

The Railroads and Passenger Air Transport, C. E. MCCULLOUGH
Fundamentals and Certain Details of Airport Design and Construction, PHILIP R. LOVE
Management of an Airport, JOHN BERRY

Aerodynamics

Landing Speed of Airplanes, JOHN G. LEE
A Study of Airplane Ceilings, L. C. BREGUET and MAURICE ROY

Wednesday Morning, May 29

Flying Problems

Problems in Flying, J. H. DOOLITTLE
The Ice Hazard in Flight, C. G. ANDRUS
Air Navigation, GEORGE R. FAIRLAMB, JR.

Airships

Design, Construction, and Handling of Non-Rigid Airships, THOMAS L. BLAKEMORE, J. F. BOYLE, and NORMAN MEADOWCROFT
Airship Developments with Particular Reference to Burney Rigid Airship R-100, C. DENNIS BURNEY and ROBERT T. POLLOCK

Engines

Radial versus In-Line Engines, GLENN D. ANGLE
Some Aspects of Airplane Engines, ARTHUR NUTT

Wednesday Afternoon, May 29

General Session

The Commercialization of Aeronautics, W. B. ROBERTSON
The Metalclad Airship, CARL B. FRITSCHE

Instruments

Recent Developments in Aircraft Instruments, W. G. BROMBACHER
Installing and Servicing Aircraft Instruments, JOHN D. PEACE, JR.

Welding

Development of Welded Aircraft Construction, S. C. CLARK and W. I. GASTON
Comparison of Reinforced-Shell and Steel-Tube Fuselage Construction, W. C. CUMMING

Interest in the St. Louis meeting was stimulated by a good-will air tour made by a group of ten. The "Gold Shell," a new, trimotored Fokker plane, left St. Louis on April 22 for a five-day tour of Local Sections in Chicago, Detroit, Cleveland, Buffalo, Pittsburgh, Cincinnati, Indianapolis, and Dayton. Luncheon or dinner meetings were arranged by the Sections in those cities. Those who made the trip were: Miss Amelia Earhart, first woman to fly the Atlantic; Victor J. Azbe, chairman of the committee in charge of the Meeting

and ex-chairman of the St. Louis Section; Major T. A. Peck, of the Shell Petroleum Co. of St. Louis, who was in charge of the plane; Ernest Hartford, assistant secretary of the A.S.M.E., in charge of Local Sections; Robert M. Boyles, editor of the St. Louis *Forge;* Archibald Black, representing the Aeronautic Division of the Society; Phil R. Love, flying partner of Colonel Lindbergh during the days he flew the air mail between Chicago and St. Louis; Thomas W. Parry, Jr., official press representative; Milton Girton, chief pilot; and Stanley Smith, co-pilot.

Many famous aeronautic celebrities attended the meeting, including transoceanic pilots, leading airship designers, army and navy air experts; Commander Byrd sent his greetings from the South Pole, and others unable to be present sent special messages.

Special Exhibits

St. Louis made the period of the meeting a real aeronautic celebration. Exhibits were arranged all over the city. In the lobby of the Jefferson Hotel, headquarters of the meeting, there was an extensive exhibit including an exact replica of the "*Spirit of St. Louis,*" anti-aircraft gun mounts, parachutes, balloon baskets, a mosaic air picture of Metropolitan St. Louis comprising about 1000 exposures, etc. The St. Louis Public Library and all its branches had special exhibits of airplane models, posters and aerial maps, aviation books, etc.

A novel airplane exhibit was displayed at Lambert, St. Louis Flying Field. One hundred twenty-five American airplane manufacturers were invited to fly to St. Louis and group their planes for inspection and demonstration to the public of the extent of this industry in America.

"Spirit of St. Louis" Medal

The St. Louis Section deserves great credit for the success of the meeting, as two of the features that attracted nation-wide interest were locally financed and initiated. These two features were the honor roll of 73 who had made outstanding contributions to aeronautics in the last two years, the first twelve being each awarded a gold watch, and the founding of a permanent A.S.M.E. Aeronautic Medal, to be known as the "Spirit of St. Louis" Medal.

These awards were announced at the banquet on Wednesday evening. Daniel Guggenheim, founder of the Guggenheim Fund for the Promotion of Aeronautics, and recipient of the first "Spirit of St. Louis" medal, "for meritorious service in the advancement of aeronautics," was unable to be present on account of ill health, and the medal was held for formal presentation later.

"Honor Roll of Aeronautics"

The calling of the "Honor Roll of Aeronautics" was most impressive. The local committee had made a nation-wide poll of leaders of aviation to find the twelve most deserving of recognition gifts for aeronautical achievements since Lindbergh's Transatlantic flight. Orville Wright made the presentation of these gifts. The following twelve were selected and each of them was presented with a gold watch:

William E. Boeing, President, Boeing Airplane Company and Boeing Air Transport, Inc., "Development of a great transportation system"

Lieut. James H. Doolittle, U. S. A., Daniel Guggenheim Foundation, "Scientific flying of high value at great personal risk"

Miss Amelia Earhart, Aviation Editor of "Cosmopolitan," "Remarkable work in popularizing aviation"

Carl F. Egge, Executive Secretary, National Pilots' Association, "Services rendered for advancement of practical pilotage"

Brig. Gen. William E. Gilmore, Chief of Matériel Division, Wright Field, "Wright Field contributions to aeronautics"

Capt. F. C. Hingsburg, Chief Engineer, Airways Division, Department of Commerce, "Aids to aerial navigation — establishment of lighted airways"

Prof. Alexander Klemin, In Charge Daniel Guggenheim School of Aeronautics, New York University, "Dissemination of aeronautical knowledge"

Dr. G. W. Lewis, Director of Aeronautical Research, National Advisory Committee for Aeronautics, "Application of research methods — research work on engines"

Hon. William P. McCracken, Jr., Assistant Secretary of Commerce for Aeronautics, "Untiring efforts toward the advance of aeronautical science and education"

Igor I. Sikorsky, Manufacturer of Airplanes, "Development of large airplanes — amphibians"

Ralph Hazlet Upson, Chief Engineer, Aircraft Development Corporation, "Lighter-than-air developments"

Lieut. Alford J. Williams, U. S. N., Navy Department, Bureau of Aeronautics, "Research work in advancing practical flight"

Harold M. Bixby was the toastmaster at the banquet, and Dr. Viljalmur Stefansson, the Arctic explorer, gave a brilliant talk on the possibilities of the Arctic as the future airway for Asiatic and Northern European travel.

Noted aviation guests were introduced to the audience and among these were the two pilots, R. L. Robbins and James Kelly, who in a second-hand plane, on Sunday, May 26, in Fort Worth, Texas, had broken the endurance flight record formerly held by the *Question Mark*.

Other evening events were an informal reception and an illustrated address by President Sperry on "The Gyroscope and Its Uses in Aeronautics" on Monday evening, and a smoker arranged by the local committee on Tuesday evening.

Tuesday's Special Airship Program

Tuesday, May 28, will be remembered by airship enthusiasts as a special event in lighter-than-air history. Those interested in this subject were guests on this day at the Army airship grounds, Scott Field, of which Col. John Paegelow is commander. The two lighter-than-air sessions were held at the field, one in the morning and the other in the afternoon. Between the sessions the guests were entertained by airship exhibit flights and by inspection of the giant hangar, mooring mast, helium plant, and training school. An army lunch was served at noon.

Gardner Cup Air Races

Thursday many of the visitors participated in the Decoration Day Gardner Cup Air Races and events at East St. Louis. The final races consisted of a non-stop flight from Parks Airport to Indianapolis and return. While waiting for the return of the racers the audience was entertained by formation and acrobatic flying by the Thirty-Fifth Division Air Service commanded by Major C. Ray Wassall, and also by acrobatic flying by H. Speer, E. Hedeen, Jimmy Doolittle and Barney Zimmersley, the pilot who broke two altitude records during the meeting by climbing 25,000 feet in a light two-place plane.

On Wednesday the St. Louis Air Board arranged for a joint luncheon with those attending the meeting, with several prominent speakers on aeronautic subjects.

Entertainment for Visiting Ladies

The visiting ladies were delightfully entertained by a program arranged by a local committee, headed by Mrs. J. C. Pritchard. Their program consisted of a luncheon at Town Club Monday noon, an auto ride through Forest Park and Shaw's Gardens in the afternoon, and in the evening the informal reception. On Tuesday there was a joint luncheon of various clubs at which Miss Earhart spoke, an afternoon visit to see the Lindbergh trophies, and a theater party in the evening. On Wednesday there was a reception at the Lambert Airport where the visitors saw airplanes being manufactured and also had an opportunity to take a flight. The afternoon was spent in bridge at the North Hills Country Club, and the banquet was the program for the evening.

Aeronautic Division

Cleveland, Ohio, August 31, 1929

The Great Lakes Aeronautic Meeting and Engineers Aviation Day, held on Saturday, August 31, 1929, during the Cleveland Airplane Races and Show, was arranged by the Aeronautic Committee of the Cleveland Engineering Society and the A.S.M.E. Aeronautic Division and Cleveland Local Section, in cooperation with the Air Races Committee.

The day opened at the Municipal Airport with several hundred attending a meeting in the morning in a new Austin hangar just constructed at the airport. The presiding officer was the Hon. David S. Ingalls, Assistant Secretary of the Navy for Aeronautics. The principal speaker was Señor Juan de la Cierva, of Spain, who discussed the theory of his invention, the autogiro.

Two other outstanding speakers were Adolf Rohrbach, of Berlin, famous for his flying-boat designs, who discussed "Flying Boat Design and Development in Europe," and Igor Sikorsky, who spoke on "Some Aspects of the Seaplane and the Amphibian." Another paper presented was "Seaplane Design," by T. P. Wright and Guy Luburg, chief and assistant engineer respectively, airplane division, Curtiss Aeroplane and Motor Co., Garden City, N. Y. The following papers were presented by title: "Some Phases of Seaplane Transportation," by J. T. Trippe, President of the Pan-American Airways, Inc., New York, N. Y.; "Aircraft Float Design and Construction," by Captain H. C. Richardson, of the Great Lakes Aircraft Corporation, Cleveland, Ohio; and "The Problem of Catapulting Aircraft from Commercial Vessels," by Lieut. W. M. Fellers, U. S. Navy.

Immediately following the meeting there was held a very successful luncheon which over seven hundred attended. Brief remarks were made at the luncheon by the Mayor of Cleveland, City Manager of Cleveland, and Miss Amelia Earhart. Among the special guests at the luncheon was Mr. Harvey Firestone, President of the Firestone Tire and Rubber Co. Warner Seely, former Chairman of the Cleveland Section of the A.S.M.E., presided.

The remainder of the afternoon was spent in witnessing the finals of many of the most interesting races of the week.

Fuels Division

Philadelphia, Pa., October 7-10, 1929

A record attendance of more than 1000 at the Third National Fuels Meeting of the Fuels Division of the Society at Philadelphia, October 7 to 10, 1929, attested to the great interest which was aroused

over a program of technical papers in which emphasis was placed not upon power-plant problems but upon domestic and industrial phases of fuel utilization and upon smoke abatement.

Technical Sessions

The meeting was opened in the Bellevue-Stratford Hotel on Monday morning with an unusually good attendance for an opening session. The Hon. Harry A. Mackey, Mayor of Philadelphia, welcomed the visiting engineers. Conrad N. Lauer, Vice-President Elect of the Society, and representing President Elmer A. Sperry at the meeting, responded to the Mayor's greetings.

Dr. Robert H. Fernald, Director of the Department of Engineering, University of Pennsylvania, was then introduced by Victor J. Azbe, Chairman of the Fuels Division, for the presentation of his address on "The Fuels Engineer, His Training and Work." Dr. Fernald lamented the weakness of many of our mechanical engineering curricula in the very essential subject of fuel utilization. He made valuable suggestions which should help to stimulate increased activities on the part of educators. Quoting headlines, he showed the important part fuel plays in international affairs.

Other sessions held during the meeting were devoted to domestic heating, stokers, industrial heating, boiler-furnace water walls, and smoke abatement. In addition there were several general sessions. The papers presented at each of these sessions were as follows:

Monday Morning, October 7

Opening Session

The Fuel Engineer, His Training and Work, Prof. R. H. Fernald

Monday Afternoon, October 7

General Session

Relative Economy of Pulverized Coal, Oil and Gas as Boiler-Plant Fuels, Martin Frisch
Sampling of Pulverized Fuel, Horace C. Porter
Liquefied Petroleum Gases as Industrial Fuels, R. W. Thomas

Domestic Heating

Some Fundamentals of the Domestic Heating Problem, Samuel S. Wyer
Stokers for Heating and Small Industrial Power-Plant Boilers, Joseph Harrington

Tuesday Morning, October 8

General Session

Economics of Reclamation of Anthracite Silt Coal and Culm, FREDERICK H. DECHANT
The Preparation of Anthracite, T. M. CHANCE
Coal Pretreatment, CLARENCE B. WISNER

Stokers

Recent Developments in Stoker Design, H. D. SAVAGE

Industrial Heating

Psychology of Smoke and Fuel Waste in Ceramic Plants, VICTOR J. AZBE
Economics of Industrial Heating Practice, J. A. Doyle
Use of Fuel in the Manufacture of Portland Cement, H. P. REID

Tuesday Afternoon, October 8

Industrial Heating

Electrically Heated Hardening and Tempering Baths Compared with Fuel Methods of Heating, WIRT S. SCOTT
Gas for Industrial Purposes, HENRY O. LOEBELL
Oil for Industrial Heating Furnaces, LEOD D. BECKER

Wednesday Morning, October 9

General Session

Carbonization-Plant "Lurgi" Process of Lehigh (N. D.) Briquetting Company, MAX TOLTZ
The Hayes Process Low-Temperature Carbonization Plant at Moundsville, W. Va., J. D. MCQUADE

Power Plants

Some Economic Considerations of Water-Wall Installations, OLLISON CRAIG
Economics and Design of Water-Cooled Furnaces, J. S. BENNETT and P. N. OBERHOLTZER
Effect of Fouling in Boiler Efficiency, J. W. PIERSON

Wednesday Evening, October 9

Domestic Heating

Economics of House Heating and Insulation, H. B. JOHNS
Gas as a Domestic Heating Fuel, M. J. ROBERTS
Oil Fuel for Homes, S. D'ARCY RICKARD
A Study of Electric House Heating, A. R. STEVENSON, JR. and F. H. FAUST
Economic Status of Anthracite and Factors Affecting its Use as a Domestic-Heating Fuel, A. F. DUEMLER
Bituminous Coal for Domestic Heating Purposes, F. R. WADLEIGH
Coke as a Domestic Heating Fuel, P. NICHOLLS and B. A. LANDRY

Thursday Morning, October 10

Smoke Abatement

General Aspects of the Smoke-Prevention Problem, HARVEY N. DAVIS
Mechanical and Human Elements in Smoke Abatement, GEORGE C. FISHER
Smoke-Abatement Methods in Knoxville, F. L. WILKINSON, JR.
Smoke-Abatement Progress in Salt Lake City, J. BILLETER

Thursday Afternoon, October 10

Smoke Abatement

Atmospheric Pollution and Sunlight, PHILIP DRINKER, ROBERT M. THOMSON, and SARAH P. CHOATE
Photo-Electric Smoke Recorder, V. P. GRIFFIN and H. V. BREISKY
The Photographic Recording of Smoke, VICTOR J. AZBE

Perhaps the highest point of interest at the entire meeting was the domestic session of Wednesday evening. Designed primarily to acquaint the general public with some of the principal fuel problems and their possible solution, the meeting proved one of tremendous interest to the engineers in attendance as well as to the non-technical men.

Thursday's smoke abatement sessions also proved quite valuable in that they drew out further records of activities in cities in which smoke campaigns are being waged. Instruments for the measurement of smoke and for photographing offending stacks were exhibited, and attracted a great deal of attention.

A conference on coal research on Tuesday afternoon proved exceptionally valuable as a means of stimulating interest in this work.

ENTERTAINMENT

A high point in the entertainment program was the smoker on Monday evening with an attendance of approximately 750. The entire roof garden was filled with devices for playing games of chance with which the guests amused themselves collecting and losing large amounts of locally printed money. Attractive prizes, consisting of an electric clock as first prize, leather traveling bags, brief cases, pen and pencil sets, etc., were offered. Three Italians, dressed in overalls and caps, mingled with the "gamblers" and pumped piano accordians with highly satisfactory results. A buffet supper completed the evening.

Another social event of the meeting was a dinner on Tuesday evening at which Congressman Frederick N. Zihlman, of Maryland, and Dr. E. J. Cattell, of Philadelphia, were the speakers. Dr. Robert H. Fernald acted as toastmaster and read a letter from L. P. Breckenridge, Past Vice-President of the Society and a mem-

ber since 1890, expressing congratulations on the program for the meeting and encouragement for future work of the Division.

Congressman Zihlman exhibited an excellent knowledge of the importance of fuel in world activities, and the part engineers must play in solving these problems. He spoke on technological unemployment, reorganization of the coal industry, and universal peace.

Ladies' Program and Excursions

The ladies' program included tours about the city, a visit to the League Island Navy Yard, where they saw airplane maneuvers, a trip to Valley Forge, a bridge party in the Bellevue-Stratford roof garden, and a trip to Sears, Roebuck & Co.

A plant-inspection program included some of the best-known industrial establishments in the Philadelphia district. Among them were the League Island Navy Yard, including the Fuel Oil Testing Plant and Naval Aircraft Factory; the Philip Carey Co. power plant; the Valley Forge Cement Corporation plant; the heating plant of the Pennsylvania Railroad Company; the oil-refining plant of the Atlantic Refining Company; the American Engineering Company; the boiler plant of Dill and Collins Company; a boat trip touching the Delaware River industries and the port of Philadelphia; the Richmond Station of the Philadelphia Electric Company, the Philadelphia Coke Works; the plant of the Baldwin Locomotive Works at Eddystone, Pa.; the pulverized coal boiler plant of the Aberfoyle Manufacturing Company; and the Westinghouse Electric & Manufacturing Company.

Iron and Steel Division

Cleveland, Ohio, September 11-13, 1929

More than 300 members and guests attended the Third National Meeting of the Iron and Steel Division, held at Cleveland, Ohio, September 11-13, 1929, in conjunction with the National Metal Congress and Metal Week, and under the auspices of the Cleveland Section. The technical groups participating in the Congress, together with the Iron and Steel Division, were the Iron and Steel Division and Institute of Metals of the A.I.M.E., the American Welding Society, and the A.S.S.T.

The program of the Division opened Wednesday noon at the Hotel Hollenden with a small luncheon at which the 1930 activities of the Division were discussed. At this luncheon Prof. W. Trinks, having just returned from a tour of German steel plants, gave a short

and remarkably interesting talk on a few of the latest developments in the German iron and steel industry.

Two of the four technical sessions were joint sessions, one with the American Welding Society on Thursday afternoon, and one with the American Society for Steel Treating on Friday afternoon. At the Thursday afternoon session the A.S.M.E. Research Committee on Heavy Duty Anti-Friction Bearings presented a preliminary report in which it was recommended that a fellowship be established at the Carnegie Institute of Technology to conduct the investigation of this subject. This committee is sponsored by the Iron and Steel Division. Following its report there was a discussion of another project under consideration by the Division, regarding the problems of hot sawing of rolled steel sections and the need of an investigation into type of saw, form of teeth, peripheral speed, etc.

The papers which were presented at the technical sessions were as follows:

Wednesday Afternoon, September 11

Recent Developments in Blast-Furnace Design and Construction, Arthur McKee and Wm. A. Haven
Ore-Handling Bridges, Alexander C. Brown
Oil-Electric Locomotives in Steel-Mill Transportation, W. L. Garrison

Thursday Afternoon, September 12

Welding

(Joint Session with A.W.S.)

Non-Destructive Tests of Welds, Elmer A. Sperry
Foreign Practice in Welding Boiler Tubes and Drums, Geo. A. Orrok
Automatic Arc Welding of Thin Sheets, W. L. Warner

Friday Morning, September 13

Use of Alloy Steels in Iron- and Steel-Mill Equipment, E. R. Johnson and O. Bamberger
Evolution of Drives for Mill Table Rollers, K. Feller

Friday Afternoon, September 13

(Joint Session with A.S.S.T.)

Temperature Distribution in Combustion Furnaces, M. H. Mawhinney
Some Notes on Producer Gas and Other Fuels, Victor Windett

On Thursday morning, members of the Division joined in an inspection trip with the members of the American Institute of Mining and Metallurgical Engineers. More than 175 left on a special train for a tour of the ore docks, central furnace, and Cuyahoga Works of the American Steel & Wire Co. The special train and luncheon were furnished through the courtesy of the Pennsylvania Railroad.

On Thursday evening the members of the Division joined in the banquet of the American Society for Steel Treating. The principal speaker of the evening was W. E. Wickenden, President of the Case School of Applied Science.

There was a joint ladies' program arranged for the ladies accompanying their husbands to any of the various society meetings.

Machine Shop Practice Division

Cleveland, Ohio, September 30–October 4, 1929

The Machine Shop Practice Division was responsible for two sessions of the Second Machine Tool Congress, held at the Hotel Cleveland during the week of the National Machine Tool Builders' Exposition, September 30–October 4, 1929.

At the first of these sessions, on Monday evening, September 30, George T. Trundle, Jr., president of The Trundle Engineering Company, Cleveland, Ohio, presented a paper on "What Information Does the Machine-Tool Buyer Need from the Machine-Tool Salesman?" On Tuesday evening the speaker was Dr. Zay Jeffries, consulting engineer for the General Electric Company, Cleveland, whose subject was "The Present Status of Cemented Tungsten Carbide Tools and Dies."

The sessions on the evenings of October 2 and 3 dealt with Production and were under the auspices of the Production Committee of the Society of Automotive Engineers.

The Congress closed with a joint dinner on Friday evening, October 4.

The Exposition, for which the days were left free, had two hundred and sixty exhibitors, with more than five hundred tools in operation.

Materials Handling and Management Divisions

Detroit, Mich., May 1-3, 1929

Under the auspices of the Detroit Section a joint National Meeting of the Materials Handling and Management Divisions, with the American Management Association cooperating, was held at Detroit, Mich., May 1-3, 1929. Headquarters were at the Book-Cadillac Hotel. There was a registration of nearly 500.

The program was laid out with the special thought of following production and handling through the various departments of the automotive industry. As the second national meeting of both the Materials Handling and Management Divisions it stimulated further progress and development for both divisions.

The technical sessions, which began on Wednesday afternoon, May 1, offered the following papers:

Wednesday Afternoon, May 1

Management Applied to Materials Handling, JAMES LYNAH
Materials Handling in a Forge Shop, HUGH DEAN
Materials Handling in the Foundry, L. W. PARDEE

Wednesday Evening, May 1

General Survey of Materials-Handling Conditions, JOHN CARMODY
Sheet-Metal Work in Automotive Plants, GEORGE E. HAGEMANN

Thursday Afternoon, May 2

Body Work in Automotive Plants, GEORGE E. HAGEMANN
Cleaning and Painting of Automobile Parts, WILLIAM PFEIL

Friday Afternoon, May 3

Materials Handling in General Assembly, GORDON LE FEBVRE
Material Routing to the Car-Assembly Line, L. A. CHURGAY, SR.
Procedure of Material Control, HOWARD H. FLAGG

Friday Evening, May 3

Applications of Automotive Methods to Other Industries

Plate Glass Manufacture by the Continuous Process, C. W. AVERY
Production Method Used in the Electrical Industry, E. L. SPRAY
Straight-Line Production Applied to Stove Manufacture, ALVIN G. SHERMAN
Progressive Assembly in a Washing-Machine Factory, H. M. LANE

Two special features of the program were the banquet on Thursday evening and a gathering of materials-handling equipment manufacturers at a dinner Wednesday evening to discuss ways of aiding the Materials Handling Division in its work of educating industry to better handling methods.

At the Wednesday dinner Harold V. Coes, of Ford, Bacon & Davis, Inc., New York, discussed the drawbacks to more rapid progress in the use of modern materials-handling methods. After several others spoke on the subject, Jervis Webb of Detroit offered a resolution which was passed, that George Hagemann, chairman of the Division, appoint a committee representing the whole field to find ways and means to assist the Division in its work.

At the Thursday banquet, Prof. C. F. Hirshfeld, chief of Research Department of the Detroit Edison Co., was the principal speaker, and gave a very stimulating talk on the application of ideas in one field to another, with the necessity of avoiding too narrow specialization.

S. W. Utley, President of the Detroit Board of Commerce and Past-President of the American Foundrymen's Association, gave a special address of welcome. John Carmody acted as toastmaster, taking the place of Col. James L. Walsh, who was unable to be present because of illness. A splendid musical entertainment was part of the banquet program and was thoroughly enjoyed.

Inspection Trips

Thursday and Friday mornings were devoted to inspection trips. Those who went to Pontiac on Thursday had their choice of the Oakland Motor Company and the Wilson Foundry Company or the General Motors Truck Company. Other trips for that morning were to the Packard Motor Company and Dodge Brothers Motor Company, and the Detroit Vapor Stove Company and Hudson Motor Car Company. On Friday morning there were trips to the River Rouge Plant of the Ford Motor Company and to the Chrysler Corporation and Chevrolet Forge Plant.

About seventy stayed over for the trip on Saturday to the Ford Airport at Dearborn and the Aircraft Development Corporation at Grosse Isle, with luncheon at the Country Club.

Ladies' Program

The ladies, of whom about fifteen attended the meeting, had an interesting program consisting of two theater parties and a tour around the city, and joined the men at the banquet and for Saturday's trip.

Oil and Gas Power Division

State College, Pa., June 24-27, 1929

The second National Meeting of the Oil and Gas Power Division was held under the joint auspices of the Central Pennsylvania Section of the Society and The Pennsylvania State College, in conjunction with the Third Annual Oil Power Conference of the college, June 24-27, 1929. It was attended by 250 members and guests and was even more successful than the first meeting held there in 1928, proving the value of a yearly gathering of specialists to discuss the problems of their field.

Of particular interest among the technical sessions were two on high-speed engines on the first day of the meeting, and that on standardization on Thursday at which a progress report of the Special Research Committee on Diesel Fuel-Oil Specifications was presented. The oil companies have offered to supply to any engine

manufacturer or large user, samples of oil at the proposed specifications so that they may make a report of running conditions to the Committee. This cooperation from the oil companies was greatly appreciated by the Research Committee and by the Diesel-engine manufacturers, exhibiting a splendid spirit of cooperation. Both acknowledged that there were problems that needed study and investigation jointly before satisfactory specifications could be definitely decided upon.

The complete technical program follows:

Monday Afternoon, June 24

High-Speed Engines

Address of Welcome, Dr. R. D. Hetzel
High-Speed Diesel-Engine Design, Otto Nonnenbruch
High-Speed Oil-Engine Pumps and Injection Valves, J. L. Goldthwaite

Monday Evening, June 24

High-Speed Engines

Combustion in High-Speed Oil Engines, W. F. Joachim
Commercial Applications of High-Speed Oil Engines, Chester H. Gibbons

Tuesday Morning, June 25

General Session

Modern Refinements in Diesel Power Plants, Edgar J. Kates
Some Results of the Oil-Spray Research, K. J. De Juhasz
Diesel Education, Roswell H. Ward

Wednesday Morning, June 26

Costs

Report of Costs Committee, Presented by Franz Eder
Maintenance and Repair of Marine Diesel Engines, Louis R. Ford

Thursday Morning, June 27

Standardization

Progress Report, Special Research Committee on Diesel Fuel-Oil Specifications, Presented by Wiley H. Butler
Standardization of Engine Ratings, H. E. Brelsford

The Banquet

The banquet, held Wednesday evening, was one of the high spots of the meeting, developing several surprises. One of these was the presentation of a camera to Prof. F. G. Hechler of Pennsylvania

State College for the splendid work he did both in behalf of Oil Power Week and in arranging the Oil Power Conferences. Dean R. L. Sackett, of Pennsylvania State College, was toastmaster, and Prof. A. J. Wood, President of the American Society of Refrigerating Engineers, made the opening address. He was followed by L. H. Morrison, who gave both an interesting and an amusing talk on the early American development of Diesel engines. The program was enlivened by music, with marimba selections by Miss Gobrecht of State College. H. A. Pratt awarded the golf prizes to the best "plowers" on the golf courses during the meeting.

Exhibit of Oil-Engine Parts

The exhibit of oil-engine parts and accessories held as part of the meeting was well attended and proved interesting and instructive. It was held in the Armory, just across the road from the hall in which the technical sessions were held. The exhibit was arranged by the college and a small charge was made for space with the profits going to oil-spray research.

Recreation

As usual, the recreational features of the meeting were very attractive. The beautiful campus and surrounding country made the country club entertainment and individual automobile trips popular, while the golf courses were very active, with the tennis courts running a close second. A mountain excursion with picnic supper was arranged for Tuesday afternoon.

About 40 ladies accompanied their husbands to the meeting and took part in a special Ladies' Program, which included a reception and motor trips.

Printing Industries Division

New York, N. Y., February 7, 1929

A valuable one-day meeting of the Printing Industries Division was held in New York on February 7, 1929, under the auspices of the Metropolitan Section of the Society. The morning was devoted to visits to the pressrooms of New York newspapers. At an afternoon session on Press Control three papers were presented, as follows:

Electric Drive for High-Speed Newspaper Presses, W. L. Wright

The Manufacture of Newsprint for High-Speed Printing Presses, George D. Bearce

Fundamentals of Good Quality of Printing in Newspaper Plants, Harold E. Vehslage

In the evening a session attended by 700 was given on High-Speed Newspaper Production. A paper on "The Reorganization and Reconstruction of the Newspaper Printing Press," by Henry A. Wise Wood, was followed by discussion prepared by representatives of R. Hoe & Co., Walter Scott & Co., Duplex Printing Press Co., and Goss Printing Press Co., and by general discussion from the floor.

Printing Industries Division

Pittsburgh, Pa., November 7-8, 1929

An international conference of technical experts in the printing industry on the need for research was called in Pittsburgh, Pa., on November 7 and 8, 1929, by the Executive Committee of the Printing Industries Division. This meeting was suggested by the Research and Survey Committee of the Division and was held under the auspices of the Pittsburgh Section of the Society. The following organizations participated in the conference: United Typothetae of America, New York Employing Printers' Association, International Association of Printing House Craftsmen, Club of Printing House Craftsmen of New York, Employing Bookbinders of America, American Photo-Engravers Association, Photo-Engravers Board of Trade of New York, International Association of Electrotypers, Lithographers National Association, Lithographic Technical Foundation, National Association of Printing Ink Makers, Technical Association of the Paper and Pulp Industry, American Newspaper Publishers Association, National Publishers Association, National Association of Book Publishers, Publishers Association of New York, Associated Business Papers, American Association of Advertising Agencies, Association of National Advertisers, International Printing Supply Salesmen's Guild, International Trade Composition Association, International Printing Pressmen and Assistants Union, American Management Association, American Institute of Graphic Arts, and the Society for the Promotion of Engineering Education.

There was an attendance of about 330.

Technical Program

Among the speakers were Hon. George H. Carter, the Public Printer of the United States, Washington, D. C.; Herr Franz Helmberger, the Director of the Reichsdruckerei, Berlin (the Official Printer of Germany); and Mr. John Munro, Supervisor of Plant, Government Printing Bureau, Ottawa, Canada.

The leaders in their lines told of the present programs of research in their respective divisions of the graphic arts; other leaders told of the present problems in the industry that might yield to research;

specialists related how the difficulties of other industries had yielded to research; and engineers advised how the problems could be approached from their practical angle. The fields of newspaper, book and magazine, and general printing were covered. The printing, lithographing, photo-engraving, electrotyping, and bookbinding industries related their most recent practice. The raw materials of the industry, such as paper and ink and metal, had their experts who detailed recent efforts toward standardization and the methods of manufacture that aided better printing. Humidity control and materials handling and printing machinery manufacture and operation had their exponents.

Strickland Kneass, Chairman of the Pittsburgh Local Section, welcomed the guests at the opening session, and E. P. Hulse, Chairman of the Division, made the response. The complete program of technical papers follows:

Thursday Morning, November 7

The Necessity for Research in the Printing Industry, GEORGE H. CARTER
The Evolution of the German Printing Trade, FRANZ HELMBERGER
What British Printers Are Doing to Encourage Research, JOHN R. RIDDELL

Thursday Afternoon, November 7

What the Bureau of Standards Has Done in Research for the Printing Industries, HENRY D. HUBBARD
How the Engineer Would Approach the Problem, L. W. WALLACE
Research Problems in the Newspaper Printing Field, JOHN W. PARK
Research Problems in the General Printing Field, GEORGE K. HEBB

Friday Morning, November 8

Symposium on Research Problems

Research Problems in Lithographic Printing — The Lithographic Technical Foundation, L. S. HAWKINS
Research Problems in Lithographic Printing and Machinery, THOMAS R. JONES
Research Problems in Photo-Engraving, WILLIAM J. WILKINSON and ADOLPH SCHUETZ
Research Problems in Electrotyping, HAMILTON E. MACARTHUR
What Research Can Do for the Bookbinding Industry, ROY C. BAKER and F. R. BLAYLOCK
Limitations of Standardization and Research in Ink Making, EDWIN M. VAN DYCK and WALTER W. MOCK
What Research Has Done in Paper Making and Using, J. NEWELL STEPHENSON
What Research Has Done in Type Metal, G. W. THOMPSON

Friday Afternoon, November 8

Accuracy in Printing-Press Construction, JOSEPH R. BLAINE
Research Applying to the Relationship of the Impression and Plate Cylinders of Newspaper Printing Presses, THEODORE T. ELLIS
Practical Results from Humidity Control in a Modern Printing Plant, J. HORACE MCFARLAND and CARL W. DAVIS
Research — From the Operator's Standpoint, GEORGE L. BERRY and L. W. CLAYBOURN
Effect on Research and Production of Present Material-Handling Methods, GEORGE E. HAGEMANN

The social affairs of the conference included three dinners and a luncheon. On Wednesday night, November 6, Dr. Thomas Stockham Baker, President of the Carnegie Institute of Technology, gave a dinner at the Pittsburgh Athletic Association to the members of the Division's Executive Committee and of the Research and Survey Committee.

On Thursday at the Schenley Hotel the main banquet was enjoyed with Dr. Baker as the toastmaster. The speakers were three representatives of government printing offices; John R. Riddell, principal of the London School of Printing; George R. Keller, President of the United Typothetae of America; Frederick M. Feiker, managing director of the Associated Business Papers; Edward Pierce Hulse, chairman of the Printing Industries Division; Arthur C. Jewett, director of the College of Industries, Carnegie Institute of Technology, and chairman of the Divisional Research and Survey Committee; and John Clyde Oswald, managing director of the New York Employing Printers' Association.

The business dinner on Friday night was the opportunity for action on a resolution passed during the conference for the establishment of a printing industries research foundation. A Ways and Means Committee was named with Mr. George K. Hebb, of Detroit, as the chairman.

On Friday the delegates attending the meeting were luncheon guests of F. F. Nikola, president of the Miller Printing Machinery Co., at their new plant in Allegheny.

The larger printing and newspaper plants of Pittsburgh were opened for inspection, and many of the delegates stayed over on Saturday to visit them, particularly the great plant of The Pittsburgh Press.

Railroad Division

State College, Pa., June 21, 1929

The Railroad Division of the Society held a joint session with the American Society of Refrigerating Engineers at Pennsylvania State

College, on June 21, 1929. The topics of the two sessions were Transport of Perishables and Refrigerator-Car Design. The following papers were presented and were well discussed: "Economic Factors in Handling Perishables by Rail," by J. W. Roberts; "Current Practice of Transit Refrigeration," by E. F. McPike; "Governing Factors in Transportation of Perishable Commodities," by L. A. Hawkins; "Practice in Refrigerator Car Design," by E. A. Sweeley; "Research Studies of Refrigerated Trains," by R. W. Waterfill; and "Recent Applications of Refrigeration for Pre-Cooling," by C. P. George, Jr.

On Friday evening there was a joint banquet at which G. G. Ogden, general traffic manager of the Pennsylvania Railroad, A. R. Stevens, Jr., of the General Electric Co., President Ralph D. Hetzel of State College, and Professor A. J. Wood, were the speakers.

Part of the exhibit held in conjunction with this meeting was of especial interest to railroad engineers for two railroad cars were on exhibit, one of the latest silica gel process and the other a refrigerator express car of the most improved type.

Textile Division

Lowell, Mass., May 17, 1929

The Textile Division held a joint meeting with the Textile Section of the National Safety Council at Lowell, Mass., on May 17, 1929. The faculty, students, and alumni of the Lowell Textile School cooperated in this meeting, which included two sessions and a luncheon meeting.

A Round Table Conference in the morning was led by the Lowell Textile School alumni engaged in practical textile work. A paper on "The Safety Engineer's Problems in a Textile Mill" was presented by George L. Warfield.

At the afternoon session a paper by H. R. Reynolds on "The Principles of Ball and Roller Bearings" was followed by several short talks by prominent engineers on the problems of the textile industry.

Wood Industries Division

Rockford, Ill., October 16-18, 1929

The Wood Industries Division of the Society held its most successful National Meeting in Rockford, Ill., October 16-18, 1929, with headquarters at the Hotel Faust. This was the Fourth National Meeting of the Division and was outstanding for the remarkable enthusiasm it inspired among those attending. The meeting was under the auspices of the Rock River Valley Section and included three technical sessions, plant-inspection trips, a banquet, and an

all-day trip on Friday to Beloit, Wis., and the Forest Products Laboratory, at Madison, Wis. About 300 were present, with each technical session having over 100 in attendance. Over 200 were at the banquet, while 60 took the all-day trip to Madison.

Inspection Trips

The meeting opened on Wednesday morning, October 16, with special trips arranged to some of the local plants.

Thursday morning was also devoted to excursions, the plants which were open for inspection being the Rockford Furniture Company and Rockford Cabinet Company, Haddorff Piano Company, Mattison Machine Works, builders of woodworking machinery, Greenlee Bros. & Co., builders of metal and woodworking machinery and makers of tools, and the Yates-American Machine Company, builders of woodworking machinery, at Beloit, Wis.

On Friday there was an all-day trip to Beloit and Madison. The party first went to Beloit, where they visited the Yates American Plant and were the guests at lunch of the company and were entertained by Yates American Band. The afternoon was spent at the Forest Products Laboratory, Madison. The inspection trip included a tour through the Timber Mechanics Section, where airplane parts, timber grading, box testing, and other wood testing is done; through the New Soils Building, where tests on glue and plywood were demonstrated, and experiments conducted on paints, moisture-resistant coatings and fire-resistance of wood were explained, and through the main building, which gave an insight into methods of preservation, wood distillation, making of paper and pulp, and the experiments being conducted with dry kilns.

Technical Sections

The session on Wednesday evening on Woodworking Machinery was the banner session of the meeting, with more than 150 in attendance. The technical program for the meeting was as follows:

Wednesday Afternoon, October 16

Opening Session

The Coordination of Production and Distribution of Wood Products, Carle M. Bigelow and Thomas D. Perry

Making Animal Glue Water Resistant, F. L. Browne

Scandinavian Gang-Saws for Closer Utilization of Timber, Axel H. Oxholm

Wednesday Evening, October 16

Woodworking Machinery Symposium

Drum Sander Manufacture and Use, RICHARD A. WILLIAMS
Tools for Boring and Mortising Wood, A. H. HAWKINSON
Design and Application of Precision Machinery for the Manufacture of Piano Action Parts, S. P. EKSTROM

Thursday Afternoon, October 17

Wood Development

Plywood Cores as a Foundation for Good Woodwork, THOS. D. PERRY and E. VERNON KNIGHT
Mass Production of Radio Cabinets, ARCHER W. RICHARDS
Wood Bending, THOMAS R. C. WILSON
End Coatings for Logs and Lumber, LAWRENCE C. TEESDALE

INFORMAL DINNER

At the informal dinner held on Thursday evening entertainment was provided by a band of forty pieces, made up of employees of the Yates-American Machine Co., and by a chorus of forty voices of employees of Greenlee Bros. & Co. The entertainment was followed by a talk by John Purdy, president of Greenlee Bros. & Co., on experiences in the development of woodworking machinery. The other speaker on the program was Frederick Knack of the Aerotech Co., Moline, Ill., who gave an interesting talk on the use of wood in aeroplane manufacture and the future prospects in this field. This was followed by two films, one on the manufacture of radio cabinets and the other from Japan, which reproduced aeronautic research pictures taken at the high rate of 20,000 photographs a second. The toastmaster of the dinner was Wm. Braid White, acoustic engineer of Chicago, Chairman of the Wood Industries Division for several years.

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INDEX TO PUBLICATIONS

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Aeronautical Symbols, A.S.A., Z 10e-1929
Cast Iron Long Turn Sprinkler Fittings, A.S.A., B 16g-1929

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A.S.M.E. Research Reports and Papers, 1929

Power Test Codes

General Instructions, 1929 Series, December, 1929
Instruments and Apparatus—Part II, Pressure Measurements, Chapter 1 on Barometers, and Chapter 6 on Tables, Multipliers and Standards for Barometers, Mercury for Steam Columns and Pressure Measurements, 1923 Series, June, 1929

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Dictionary of Aeronautical Terms, J. Vanièr
Robert Henry Thurston, William F. Durand
The Engineering Index for 1928
Mechanical Catalog, 1929-1930 Edition

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(BR), Book review
(C), Correspondence
(CT), Conference Table
(D), Discussion
(E), Editorial

Sections of Transactions are denoted by the following symbols: AER, Aeronautics; APM, Applied Mechanics; FSP, Fuels and Steam Power; HYD, Hydraulics; IS, Iron and Steel; MAN, Management; MH, Materials Handling; MSP, Machine-Shop Practice; OGP, Oil and Gas Power; PET, Petroleum; PI, Printing Industries; RR, Railroads; TEX, Textiles; WI, Wood Industries.

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CONSTITUTION, BY-LAWS, RULES, AND INDEX

CONSTITUTION[1]

Article C1, Name and Government

SEC. 1 The name of this Society is The American Society of Mechanical Engineers.

SEC. 2 The Society is a corporation, organized April 7, 1880, and chartered under the laws of the State of New York, December 23, 1881. A supplemental charter was issued on October 17, 1907, when the Society was consolidated with the Mechanical Engineers' Library Association.

The principal offices of the Society shall be in the City of New York.

SEC. 3 The Society shall be governed by this Constitution, the By-Laws and the Rules.

Article C2, Objects

SEC. 1 The objects of this Society are to promote the art and science of mechanical engineering and the allied arts and sciences; to encourage original research; to foster engineering education; to advance the standards of engineering; to promote the intercourse of engineers among themselves and with allied technologists; and severally and in cooperation with other engineering and technical societies to broaden the usefulness of the engineering profession.

Article C3, Membership

SEC. 1 The membership shall consist of Honorary Members, Members, Associates, Associate-Members and Juniors.

SEC. 2 The rights and privileges of every member shall be personal to himself and shall not be transferable.

SEC. 3 Each member shall be entitled to vote on any question before any meeting of the Society, or before the Society as a whole.

SEC. 4 Every person admitted to membership shall be subject to the Constitution of the Society, and to any amendments that may be made from time to time.

Article C4, Qualifications for Admission

SEC. 1 Members of all grades shall be elected by the Council.

SEC. 2 An Honorary Member shall be a person of acknowledged professional eminence.

SEC. 3 A Member shall be an engineer, at least thirty-two (32) years of age, who has been in the active practice of his profession, or who has fulfilled the duties of a professor of engineering in a college or school of accepted standing, for at least ten (10) years, and has been in responsible charge of important work for at least five (5) years, and is qualified to design as well as to direct engineering work.

Graduation from a school of engineering of accepted standing shall be considered equivalent to two (2) years of active practice.

SEC. 4 An Associate need not be an engineer, but must have had such responsible connection with some branch of engineering, science, the arts, or industries, that the Council will consider him qualified to cooperate with engineers in the advancement of professional knowledge, and he must be at least thirty (30) years of age.

[1] Adopted at Annual Meeting, 1922.

SEC. 5 An Associate-Member shall be an engineer, at least twenty-seven (27) years of age, who has been in the active practice of his profession, or who has fulfilled the duties of a professor of engineering in a college or school of accepted standing, for at least six (6) years, and has been in responsible charge of work for at least two (2) years.

Graduation from a school of engineering of accepted standing shall be considered equivalent to two (2) years of active practice.

SEC. 6 A Junior must have had such engineering experience as will enable him to fill a subordinate position in engineering work, or he must be a graduate of an engineering school of accepted standing. He must be at least twenty-one (21) years of age, and his connection with the Society shall cease when he becomes thirty-five (35) years of age, unless he has been previously transferred to another grade.[1]

Article C5, Fees and Dues

SEC. 1 The initiation fee for membership in each grade shall be:

Member	$ 25
Associate	25
Associate-Member	25
Junior	10
Promotion from Junior to a higher grade	15

SEC. 2 The annual dues for membership in each grade shall be:

Member	$ 20
Associate	20
Associate-Member	20
Junior, for the first six (6) years of his membership	10
Junior, after six (6) years	20

SEC. 3 The Council may permit any Member, Associate, or Associate-Member to become a Life-Member in the same grade, as provided in the By-Laws.

SEC. 4 The Council may remit the dues of any member for any special reason, as provided in the By-Laws.

Article C6, Nominating Committees

SEC. 1 The membership of the Society shall elect annually a Regular Nominating Committee, whose duty shall be to select candidates for the executive offices to be filled at each annual election, as provided in the By-Laws.

SEC. 2 Other nominating committees having the same powers may be constituted by the membership of the Society, as provided in the By-Laws.

Article C7, Directors (Council) and Officers

SEC. 1 The affairs of the Society shall be managed by a Board of Directors, chosen from its membership and styled "The Council."

SEC. 2 The Directors of the Society shall consist of a President, seven (7) Vice-Presidents, nine (9) Managers, and the last five (5) surviving Past-Presidents.

SEC. 3 The Directors shall be elected at the Annual Meeting of the Society, on the first Tuesday in December, as provided in the Charter.

The election shall be by sealed letter-ballot of the membership, as detailed in the By-Laws.

SEC. 4 The President shall be elected for one (1) year, the Vice-Presidents for two (2) years, the Managers for three (3) years.

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[1] Inclusive of Junior Member elections from December, 1922.

SEC. 5 The Officers of the Society shall consist of the President, the Vice-Presidents and the Treasurer.

SEC. 6 At its first meeting after the Annual Meeting of the Society the Council shall appoint a member of the Society to serve as Treasurer for one (1) year.

The Treasurer shall perform the duties usually pertaining to this office in accordance with the By-Laws and Rules, and such further duties as may be required by the Council.

Any vacancy in the office of Treasurer shall be filled by appointment by the Council.

SEC. 7 The Directors may at any time, whenever sufficient cause shall appear to them, delegate to any member of the Society the performance of any duties required by the Constitution to be performed by any Director or by the Secretary.

Article C8, Council

SEC. 1 The Council shall have full control of the activities of the Society, subject to the limitations of the Constitution.

SEC. 2 The Council shall have power to fill vacancies in its membership by appointment until the next election, as provided in the By-Laws, except that the office of president shall be filled by the vice-president who is senior by age.

SEC. 3 The number of members constituting a quorum of the Council shall be as determined in the By-Laws.

SEC. 4. The Council shall present at the Annual Meeting of the Society a report verified by the president or treasurer or by twelve (12) members of the Council, showing the whole amount of real and personal property owned by the Society, where located, and where and how invested, and the amount and nature of the property acquired during the year immediately preceding the date of the report, and the manner of the acquisition; the amount applied, appropriated or expended during the year immediately preceding such date, and the purpose, object or persons to or for which such applications, appropriations, or expenditures have been made; also the names and places of residence of the persons who have been admitted into membership in the Society during the year.

The report shall be filed with the records of the Society, and an abstract shall be entered in the minutes of the proceedings of the Annual Meeting of the Society.

Article C9, Meetings of the Society

SEC. 1 The Annual Meeting of the Society shall be held at such time and place as the Council shall appoint, provided it begins in the City of New York and continues there during the annual election of directors, held on the first Tuesday in December.

SEC. 2 The Semi-Annual Meeting of the Society shall be held at such time and place as the Council shall appoint, as provided in the By-Laws.

SEC. 3 A Special Meeting of the Society may be called at any time and place at the discretion of the Council, or shall be called by the Council upon the written request of at least one (1) per cent of the membership.

The call for the meeting shall be issued at least thirty (30) days prior to the date set for it, and shall state the business to be considered. No other business shall be transacted at the meeting.

SEC. 4 The number of members constituting a quorum at any meeting of the Society shall be as determined by the By-Laws.

SEC. 5 An action of a Meeting of the Society shall be deemed an action of the Society as a whole. Any expenditure required by such action is subject to approval and authorization by the Council.

Article C10, Professional Divisions

SEC. 1 The Council may authorize the organization of Professional Divisions composed of members of any or all grades, which shall operate under the provisions of the Constitution, By-Laws and Rules.

Article C11, Local Sections

SEC. 1 The Council may authorize the organization of Local Sections composed of members of any or all grades, which shall operate under the provisions of the Constitution, By-Laws and Rules.

Article C12, Publications and Papers

SEC. 1 The papers and publications of the Society shall be issued in such manner as the Council may direct.

Article C13, Secretary

SEC. 1 At its first meeting after the Annual Meeting of the Society the Council shall appoint a member of the Society to serve as Secretary for one (1) year.

SEC. 2. The Secretary shall perform the duties usually pertaining to this office, in accordance with the By-Laws and Rules, and such further duties as may be required by the Council.

SEC. 3 Any vacancy in the office of Secretary shall be filled by appointment by the Council.

Article C14, Funds

SEC. 1 The deposit, investment and disbursement of all funds shall be subject to the direction of the Council.

Article C15, Professional Practice

SEC. 1 In all professional and business relations the members of the Society shall be governed by the Code of Ethics incorporated in the By-Laws.

SEC. 2 Any member who has violated the Constitution of the Society, or who is guilty of conduct rendering him unfit to remain a member, may be expelled by the vote of fifteen (15) members of the Council, after he has been given opportunity to be heard in his own defense.

SEC. 3 The Society may approve or adopt any report, standard, code, formula, or recommended practice.

SEC. 4 The Society shall forbid and oppose the use of its name or initials in any commercial work or business, except to indicate conformity with its standards or recommended practices, in accordance with the By-Laws and Rules.

Article C16, Amendments to the Constitution

SEC. 1 At any Meeting of the Society any person entitled to vote may propose in writing an amendment to this Constitution, provided that it shall bear the written indorsement of at least one (1) per cent of the membership.

Such proposed amendment shall not be voted on for adoption at that meeting, but shall be open to discussion and modification, and to a vote as to whether, in its original or modified form, it shall be mailed in printed form to the members of the Society for action.

If the members present at the meeting, not less than twenty (20) voting in favor thereof, shall so decide, then the Secretary shall mail in printed form to each person entitled to vote, at least sixty (60) days previous to the next Meeting of the Society, a copy of the proposed amendment as so decided by said vote, accompanied by any comment the Council may elect to make.

A ballot shall be sent with the proposed amendment, and the voting shall be by sealed letter-ballot, closing at noon of the twentieth (20th) day preceding the Meeting of the Society following the mailing.

The ballots shall be voted, canvassed and announced as provided in the By-Laws.

The adoption of the amendment shall be decided by a majority of the votes cast.

The presiding officer at the meeting of the Society following the close of the ballot shall announce the result, and if the amendment is adopted it shall thereupon take effect.

SEC. 2 Any changes in the order or numbering of articles or sections of the Constitution required by an amendment shall be made under the direction of the Council.

SEC. 3 This Constitution shall supersede all previous rules of the Society, and shall go into effect upon the adjournment of the meeting of the Society at which the presiding officer announces its adoption.

BY-LAWS

Article B1, Government

PAR. 1 At any regular meeting, the Council may, by a two-thirds vote of its members present, adopt or amend By-Laws in harmony with the Constitution, provided that such By-Laws or amendments shall have been submitted in writing at a previous meeting of the Council and the Secretary has mailed a copy to each member of the Council at least fifteen (15) days before the meeting at which action is to be taken. A By-Law or an amendment to a By-Law shall take effect immediately upon its adoption by the Council, and shall be published at once by the Secretary to all members of the Society.

PAR. 2 At any regular meeting, by a majority vote of its members present, the Council may adopt or amend Rules in harmony with the Constitution and the By-Laws. A Rule or an amendment shall take effect immediately upon its adoption by the Council, and shall be published by the Secretary to all the members of the Society.

PAR. 3 Any changes in the order or numbering of By-Laws or Rules made necessary by the adoption of amendments shall be made under the direction of the Council.

PAR. 4 Every question which shall come before a meeting of the Society or of the Council or of a committee, shall be decided by a majority of the votes cast, unless otherwise provided in the Constitution, the By-Laws and the Rules, or by the laws of the State of New York.

PAR. 5 The Rules contained in "Robert's Rules of Order Revised" shall govern the Society in all cases to which they are applicable, when not inconsistent with the By-Laws or the Rules of this Society.

Article B2, Objects

PAR. 1 The principal means for accomplishing the object of the Society shall include:

(*a*) Holding meetings for reading and discussing professional papers and for personal interchange of knowledge and views.

(*b*) Issuing publications.

(*c*) Investigating and reporting upon subjects of engineering interest.

(*d*) Promulgating reports, standards, codes, formulas and recommended practices.

(*e*) Encouraging affiliations of students of engineering with this Society.

(*f*) Contributing to the maintenance of the Engineering Societies Library, of which the Library of this Society is a part.

(*g*) Participating, as provided in the Rules, in joint movements with bodies having the same objects as this Society, and cooperating with affiliated societies having like purposes.

PAR. 2 The policy of the Society shall be to give papers read before it the widest publicity.

PAR. 3 The Society shall not be responsible for statements or opinions advanced in papers or in discussion at meetings of the Society or of its Divisions or Sections, or printed in its publications.

PAR. 4 The Society reserves the right to copyright, at the discretion of the Council, any of its papers, discussions, reports or publications.

Article B3, Membership

PAR. 1 The Council shall have power by resolution from time to time, to fix the number of Honorary Members.

PAR. 2 In accordance with the Rules, a proxy may be given to a member entitled to vote, but shall not be valid for more than six (6) months.

PAR. 3 Proffered resignations shall be presented to the Council for action, and shall be accepted if the requirements of the Rules have been met.

Article B4, Qualifications for Admission

PAR. 1 A candidate for admission to the Society in any grade, except Honorary Membership, or a member desiring to change his grade, shall make application to the Council on an approved form, as detailed in the Rules.

PAR. 2 Fifteen (15) affirmative votes of the Council shall be required for the election of a candidate for any grade except Honorary Membership. Two (2) negative votes shall defeat an election.

PAR. 3 Each approved candidate shall be assigned by the Council to the grade of membership to which, in its judgment, his qualifications entitle him.

PAR. 4 Nomination for Honorary Membership may be made to the Council by at least twenty-five (25) members of the Society, who shall in all cases state in writing the grounds upon which the nomination is made.

PAR. 5 Election to Honorary Membership shall be by letter-ballot of the Council. Ballots shall be mailed by the Secretary to each member of the Council at least sixty (60) days in advance of the date set for the closure of such election. One (1) negative vote shall defeat an election to Honorary Membership.

PAR. 6 All matters relating to membership shall be in charge of the Standing Committee on Membership, under the direction of the Council.

Article B5, Fees and Dues

PAR. 1 The initiation fee and that part of the annual dues from the first month following the date of election to the first day of October, shall be due and payable on the first day of the month following the date of election. Only upon the payment of this amount shall the person elected be entitled to the rights and privileges of membership in the grade to which he is assigned. If such person does not comply with this requirement within three (3) months after notice of his election, the Council may declare his election void.

PAR. 2 The annual dues for each ensuing year shall be due and payable in advance on the first day of October.

PAR. 3 A member whose dues shall remain unpaid for three (3) months shall in the discretion of the Council not be entitled to the publications until his dues are paid.

PAR. 4 A member whose dues shall remain unpaid for twelve (12) months, shall, in the discretion of the Council, be stricken from the roll of membership and shall cease to have any further rights as a member.

PAR. 5 A bill for annual dues shall be mailed to each member by October 1 of each year. Notice of arrears shall be sent thereafter, as directed by the Council.

PAR. 6 At its first meeting in the calendar year the Secretary shall submit to the Council a list of the delinquents for action thereon in respect to their right to vote and receive the publications.

PAR. 7 At its first meeting after the close of the fiscal year on September thirtieth, the Secretary shall submit to the Council a list of delinquents for its action thereon in respect to their continuance on the rolls of the Society and retaining rights as members.

PAR. 8 If, in the case of non-payment of dues, the right to receive the publications of the Society or to vote be questioned, the books of the Society shall be conclusive evidence.

PAR. 9 A member may become a life member by paying the Society at one time an amount sufficient to purchase from an insurance company, satisfactory to the Finance Committee, an annuity equal to that member's dues (a) for his life expectation or (b) for the term for which he is required to pay dues in accordance with the Constitution, By-Laws and Rules.

PAR. 10 For distinguished service to the Society, the Council may confer life membership upon any member. Proposal for such action must be made at a regular meeting of the Council. Immediately following that meeting, the Secretary shall send to the members of the Council a letter-ballot upon the proposal, this ballot to close in sixty (60) days. Fifteen (15) affirmative votes shall be required to approve and one (1) dissenting vote shall disapprove such proposal.

PAR. 11 As detailed in the Rules, the Council may, for sufficient cause, temporarily excuse from payment of annual dues, any member who from ill health, advanced age or good reason assigned is unable to pay such dues; and the Council may remit the whole or part of dues in arrears, or accept in lieu thereof desirable additions to the Library, or collections.

PAR. 12 The Council may restore to membership any person dropped from the rolls for non-payment of dues or otherwise, upon such conditions as it may deem best.

Article B6, Nominating Committees

PAR. 1 The Regular Nominating Committee of the Society shall consist of seven (7) members with seven (7) alternates elected at the Annual Meeting, as detailed in the Rules. The Chairman of the outgoing Nominating Committee shall serve as an advisory member, without vote, and the Secretary of the outgoing Committee may serve as alternate for him.

PAR. 2 The members and alternates of the Regular Nominating Committee shall be elected for one (1) year, and no member or alternate shall be eligible for more than two (2) consecutive terms. Serving as an alternate shall not affect the eligibility of a member to serve on the committee for two (2) terms, if elected.

PAR. 3 The names of those elected to serve on the Regular Nominating Committee shall be published by the Secretary by the first week in February of each year, accompanied by a request for suggestions for nominees.

PAR. 4 A vacancy in a Regular Nominating Committee of the Society shall be filled by the alternate for that vacancy, or failing that, shall be filled by the Council.

PAR. 5 A Special Nominating Committee may be organized by any group of one (1) per cent of the membership of the Society in good standing certifying to the Secretary in writing their joint intention to organize such a Committee.

Article B7, Directors (Council) and Officers

(Nomination, Qualifications and Election)

PAR. 1 Within two weeks following the Semi-Annual Meeting, the Regular Nominating Committee shall deliver to the Secretary in writing the names of its nominees for the elective offices to be filled at the next election, together with the written consents of the nominees.

PAR. 2 The names and qualifications of nominees for the various offices proposed by the Regular Nominating Committee, shall be published by the Secretary immediately after the receipt of the report of the Nominating Committee.

PAR. 3 Candidates for the office of President and Vice-President shall be of the grade of Member of the Society. Candidates for all other elective offices may be of any grade of membership.

PAR. 4 Names of any nominees presented by any Special Nominating Committee must be in the hands of the Secretary by the first Tuesday in August of each year, and must be accompanied by the written consent of each nominee.

PAR. 5 On or before the third Thursday in August of each year, the Secretary shall mail to each member entitled to vote a ballot stating the names of the candidates for the elective offices to be filled at the next election, as detailed in the Rules.

PAR. 6 Voting for the election of Directors shall close at the City of New York at 10 o'clock in the forenoon on the fourth Tuesday in September in each year, and the ballots shall be canvassed, as detailed in the Rules.

PAR. 7 On or before the third Thursday in August of each year, the President shall appoint three (3) Tellers of Election of Directors, whose duty it shall be to canvass the votes cast, as detailed in the Rules. The term of office of the Tellers shall expire when their report of the canvass has been presented and accepted.

PAR. 8 By the first day of October, the Secretary shall notify the candidates having the greatest number of votes for their respective offices.

PAR. 9 The Directors shall be declared elected by the presiding officer at the Annual Meeting of the Society in December, and their terms of office shall begin on the adjournment of the Annual Meeting.

PAR. 10 If a tie occurs in the vote for any officer, the presiding officer at the Annual Meeting shall cast the deciding vote.

PAR. 11 In the election of the Vice-Presidents, three (3) shall be elected every other year and four (4) the alternate years, to serve for two (2) years.

PAR. 12 In the election of the Managers, three (3) shall be elected each year to serve for three (3) years.

PAR. 13 A member in office shall not be eligible for immediate reelection to office at the expiration of the term for which he was elected, except the Treasurer. The restriction in this paragraph shall not apply to the Secretary, who is not an Officer or Director.

PAR. 14 Members in office shall continue in their respective offices until their successors have been elected or appointed, and have accepted their offices.

PAR. 15 The President shall perform the duties regularly or customarily attaching to his office under the laws of the State of New York, and such other duties as may be required of him by the Council or the By-Laws.

PAR. 16 In the absence of the President his duties shall be performed by the Vice-President then present, senior by length of membership in the Society, or in his absence or any other disability, by any other member of the Council designated by the Executive Committee or by the Council.

PAR. 17 The Treasurer shall be the legal custodian of all funds of the Society. The investment of all trust funds and of other permanent or temporary investment of funds shall be made by the Treasurer with the approval of the Finance Committee.

The Treasurer shall take part in the deliberations of Council, but shall have no vote therein.

PAR. 18 In the absence of the Treasurer his duties shall be performed by any other officer of the Society designated by the Council or by the Executive Committee.

Article B8, Council

PAR. 1 The Council shall consider the failure of any incumbent, from inability or otherwise, to perform the duties of his office, and may, by a two-thirds vote, decree any elective office vacant. The Council shall thereupon appoint a member to fill the vacancy until the next election of officers, except for the office of the President, which shall be filled by the Vice-President who is senior by age. Such appointment shall not render the appointee ineligible for election to any office.

PAR. 2 A quorum of the Council shall consist of eight (8) members.

PAR. 3 An act of the Council which shall have received the expressed or implied sanction of the membership at the following meeting of the Society, shall be deemed to be an act of the Society and cannot afterwards be impeached by any member.

PAR. 4 The Council may order the submission of any question to the membership for decision by letter-ballot. The Council may appoint Tellers to canvass such a ballot, as detailed in the Rules. The result of such a ballot shall be binding when confirmed by formal action of the Council.

COMMITTEES, ETC., APPOINTED BY THE COUNCIL

PAR. 5 The Council shall at its first meeting of each year appoint from among its members an Executive Committee. Such committee shall consist of the president, two vice-presidents, and two managers, with voting power; also the chairman of the finance committee, the chairman of the Professional Divisions and the chairman of the Local Sections Committee, without voting power. During the interval between sessions of the Council, the Executive Committee shall have and exercise all the general powers of the Council, except power to fill vacancies in the Council, or to amend the By-Laws. The committee shall meet at the call of the president. The Secretary may take part in the deliberations of the Executive Committee, without vote. The Executive Committee shall keep minutes of its proceedings which shall be reported in each case at the next subsequent meeting of the Council.

PAR. 6 Upon the recommendation of a Meeting of the Society or upon its own initiative, the Council shall have the power to appoint, as it may deem desirable, an Administrative Committee to assist in the conduct of the affairs of the Society. Any proposed expenditure of such a committee must be authorized by the Council before it is incurred.

PAR. 7 Upon the recommendation of a Meeting of the Society or upon its own initiative, the Council shall have the power to appoint, as it may deem desirable, any Professional Committee to investigate and report upon a subject of engineering interest, except that the procedure of the American Standards Association shall be followed in organizing Sectional Committees. (See Paragraphs 43 to 44 of this Article.) Any proposed expenditure of such a committee must be authorized by the Council before it is incurred.

PAR. 8 Administrative and Professional Committees shall be standing or special, as the By-Laws and Rules provide and the Council approves. The Chairmen of Standing Committees shall be entitled to a seat in the Council, but no vote. The term of office of one (1) member of each Standing Committee shall expire at the close of each Annual Meeting.

PAR. 9 Each committee shall perform the duties required by the By-Laws and Rules, or assigned to it by the Council.

PAR. 10 The Council may terminate membership on any committee on account of continued absence of the member, from inability or otherwise.

PAR. 11 The President shall appoint a member to fill each vacancy in the Standing Committees, as detailed in the Rules.

PAR. 12 Each committee shall at its first meeting elect a Chairman to serve for one (1) year.

PAR. 13 A member of a Standing Committee whose term of office has expired, shall continue to serve until his successor has been elected or appointed.

PAR. 14 On or before the fifteenth day of October of each year, each Standing Committee shall deliver to the Secretary a written report of its work for presentation to the Council, as detailed and tabulated in the Rules. The Council may embody such report in its Annual Report presented to the Society in accordance with the Constitution.

PAR. 15 Reports of Special Committees shall follow the procedure detailed in the Rules.

Also, on or before the fifteenth day of October of each year, each Special Committee shall deliver a written progress report to the Secretary for presentation to the Council. Upon receipt of this report, the Council may, in its discretion, continue the committee.

The committee shall be discharged upon the adoption of the final report.

ADMINISTRATIVE COMMITTEES

PAR. 16 The Standing Committee on Finance shall, under the direction of the Council, have supervision of the financial affairs of the Society, including the books of account, as prescribed in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members of the Society, the term of one (1) member expiring at the close of each Annual Meeting, and two (2) members of the Council, the term of one (1) member expiring at the close of each Annual Meeting.

PAR. 17 The Standing Committee on Meetings and Program shall, under the direction of the Council, have supervision of the Meetings of the Society, except Special Meetings, as prescribed elsewhere in the By-Laws and detailed in the Rules. The Committee shall consist of (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 18 The Standing Committee on Publications shall, under the direction of the Council, have supervision of the publications of the Society, as prescribed elsewhere in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 19 The Standing Committee on Membership shall receive and scrutinize all applications for membership and report to each meeting of the Council the names of the candidates under consideration, together with the recommendations of the Committee on each, as prescribed elsewhere in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting. Any member of the Council in office shall be entitled to attend meetings of the Membership Committee and to vote therein.

PAR. 20 The Standing Committee on Professional Divisions shall, under the direction of the Council, have supervision of the Professional Divisions of the Society, as prescribed elsewhere in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 21 The Standing Committee on Local Sections shall, under the direction of the Council, have supervision of the Local Sections of the Society, as prescribed elsewhere in the By-Laws and detailed in the Rules. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 22 The Standing Committee on Constitution and By-Laws shall, under the direction of the Council, have supervision of matters affecting the Constitution, By-Laws and Rules, and shall report on all matters in this connection referred to it by the Council. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 23 The Standing Committee on Awards shall, under the direction of the Council, have supervision of the awards of the Society as detailed in the Rules or prescribed by Council. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 24 The Standing Committee on Relations with Colleges shall, under the direction of the Council, have supervision of the Student Branches of the Society and of such work of the Society as aims to further the education of engineers through the colleges and schools of accepted standing. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 25 The Standing Committee on Education and Training for the Industries shall, under the direction of the Council, have supervision of such work of the Society as deals with education and training for the industries through agencies other than the colleges and engineering schools. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 26 There shall be a Standing Committee on Library, which shall represent the Society on the Library Board of the Engineering Foundation, Inc. The functions of this Committee shall be as detailed in the Rules. The number of members of this Committee and their terms of office shall be as required by the by-laws of the Engineering Foundation, Inc.

PROFESSIONAL COMMITTEES

PAR. 27 The Standing Committee on Standardization shall advise the Council on the dimensional standardization work of the Society, including relations with the American Standards Association, as detailed in the Rules. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 28 The Standing Committee on Research shall advise the Council on the research work of the Society, as detailed in the Rules. The Committee shall consist of five (5) members, and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 29 The Standing Committee on Safety shall advise the Council on the activities of the Society having to do with engineering and industrial safety, except the activities of the Boiler Code Committee, for which special provision is made. This Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

PAR. 30 The Special Committee on Boiler Code shall, under the direction of the Council, have supervision of all the activities of the Society in connection with the A.S.M.E. Codes for Pressure Vessels, including the interpretations of these codes, as detailed in the Rules. The Committee shall be appointed by the President and confirmed by the Council, and the President shall fill all vacancies in the Committee.

PAR. 31 The Standing Committee on Power Test Codes shall, under the direction of the Council, have supervision of all the activities of the Society in connection with the A.S.M.E. Power Test Codes, including the interpretation of such codes, as detailed in the Rules. The Committee shall consist of twenty-five (25) members and the terms of five (5) members shall expire at the close of each Annual Meeting.

PAR. 32 The Standing Committee on Professional Conduct shall, under the direction of the Council, have supervision of all matters relating to the Code of Ethics and its enforcement, as required by the Constitution, and as detailed in the Rules. The Committee shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting.

Society Representation

PAR. 33 The Council may, in its discretion, appoint a member or members, or other person or persons, to represent it at meetings of societies of kindred aim or at public functions. Such delegates shall be designated as "Honorary Vice-Presidents," and their duties shall terminate with the occasion for which they are appointed.

PAR. 34 The President, subject to the approval of the Council, may nominate or appoint a member or members, or other person or persons, to represent the Society on professional or other committees organized by other societies or by Government departments or bureaus, or otherwise.

PAR. 35 The Council shall elect three (3) Trustees to serve on the Board of Trustees of the Engineering Foundation, Inc., as required in the by-laws of that body.

PAR. 36 As provided in the By-Laws and Rules, the Society shall elect delegates to serve under the direction of the Council on the American Engineering Council, as required in the by-laws of that body. If the number of delegates required to serve is at variance with the number elected or in office, the Council is empowered to make adjustments necessary.

PAR. 37 The Council shall designate the Standing Committee on Library to serve as the Society's representatives on the Library Board of the Engineering Foundation, Inc., as required in the by-laws of that body.

PAR. 38 The Council shall nominate to the Engineering Foundation, Inc. two (2) members of the Society to serve on the Engineering Societies Research Board as required in the by-laws of that body.

PAR. 39 The Council shall appoint four (4) members to represent the Society on the John Fritz Medal Board of Award, as required in the by-laws of that body.

PAR. 40 The Council shall appoint two (2) members of the Society to serve on the Committee on Washington Award of the Western Society of Engineers, as required in the by-laws of that body.

PAR. 41 The Council shall nominate three (3) members to represent the Society on the Division of Engineering of the National Research Council, as required in the by-laws of that body.

American Standards Association

PAR. 42 The Council shall designate three (3) members to represent the Society on the American Standards Association, as required by the Constitution of that body.

PAR. 43 The representatives of the Society on the Sectional Committees for which the Society is sponsor or joint sponsor, organized under the rules of the American Standards Association, shall be appointed by the President, subject to the approval of the Council.

PAR. 44 The representatives of the Society on a Sectional Committee for which the Society is not sponsor, organized under the rules of the American Standards Association, shall be appointed by the President, subject to the approval of the Council.

Article B9, Meetings of the Society

PAR. 1 An Annual Meeting may be adjourned to any other city than the City of New York upon the recommendation of the Committee on Meetings and Program, and upon authorization by the Council.

PAR. 2 A Semi-Annual (Spring) Meeting shall be held in any place only upon the recommendation of the Committee on Local Sections, confirmed by the Committee on Meetings and Program, and authorized by the Council at its regular meeting at the previous Semi-Annual Meeting.

PAR. 3 At the Annual Meeting of the Society, sixty (60) persons entitled to vote shall constitute a quorum for the transaction of business.

PAR. 4 At the Semi-Annual Meeting of the Society, fifty (50) persons entitled to vote shall constitute a quorum for the transaction of business.

PAR. 5 At a Special Meeting of the Society, fifty (50) persons entitled to vote shall constitute a quorum for the transaction of business.

PAR. 6 Any Meeting of the Society at which a quorum is present may order the submission of any question to the membership for letter-ballot, and the result, if affirmative, shall be binding upon being confirmed by the next meeting of the Society.

PAR. 7 Announcement of all Meetings of the Society shall be made by the Secretary, as detailed in the Rules.

PAR. 8 All Meetings of the Society, except special meetings, shall be in charge of the Committee on Meetings and Program, under the direction of the Council.

PAR. 9 Papers submitted or solicited for Meetings of the Society shall be subject to the Rules detailed under Publications and Papers, Article R12.

PAR. 10 Following the completion of the preliminary arrangements, the Committee on Meetings and Program shall assume charge of the Regional Meetings, as detailed in the Rules governing Local Sections.

Article B10, Professional Divisions

PAR. 1 The object of each Professional Division shall be to provide, through an organization of members of any or all grades particularly interested in a branch of engineering included in the scope of the Society's activities, means for promoting the arts and sciences of that branch.

PAR. 2 A member in any grade may register in not more than three Professional Divisions upon a written application to the Secretary of the Society.

PAR. 3 A Professional Division of the Society may be organized upon acceptance by the Council of the written request of a satisfactory number of members. Such a Division shall be designated as the . . . . . Division of The American Society of Mechanical Engineers.

PAR. 4 The provisions of the Constitution, By-Laws and Rules of the Society shall cover the procedure of all Professional Divisions, but no action or obligation of a Division shall be considered an action or obligation of the Society as a whole. This By-Law shall be imprinted on any publication issued by a Division.

PAR. 5 For the convenient conduct of its affairs, each Professional Division shall organize an Executive Committee, as detailed in the Rules. The Executive Committee shall elect its Chairman each year, and upon confirmation by the Council, he shall serve as Chairman of the Division.

PAR. 6 The function of the Standing Committee on Professional Divisions, under the direction of the Council, shall be to organize, foster and coordinate Professional Divisions and their activities as detailed in the Rules.

PROFESSIONAL GROUPS

PAR. 7 In case the number of members interested in a particular branch of the Society's work is not large enough to warrant the formation of a full Professional Division under the provisions of the By-Laws, the Council may authorize the formation of a Professional Group, and will itself appoint an Executive Committee to organize such a Group, and will designate the Chairman of the Committee. When a sufficient number of members become attached to this Group, it may petition for reorganization into a Professional Division.

Article B11, Local Sections

PAR. 1 The object of a Local Section of the Society shall be to provide means for promoting the work of the Society by a local organization of members who are resident within a given territory.

PAR. 2 A Local Section shall consist of members of any or all grades and of other persons, as provided in the Rules.

PAR. 3 A Local Section of the Society may be organized upon acceptance by the Council of the written request of a satisfactory number of members. Such a Section shall be designated as the . . . . . Section of The American Society of Mechanical Engineers.

PAR. 4 The provisions of the Constitution, By-Laws and Rules of the Society shall cover the procedure of all Local Sections, but no action or obligation of a Section shall be considered an action or obligation of the Society as a whole. This By-Law shall be imprinted on any publication issued by the Section.

PAR. 5 For the convenient conduct of its affairs, each Section shall organize an Executive Committee, as detailed in the Rules.

PAR. 6 A Regional Meeting of several Local Sections may be held in any place upon the recommendation of the Committee on Local Sections confirmed by the Committee on Meetings and Program and authorized by the Council at any regular meeting. The principal objects of Regional Meetings are to provide, with the Semi-Annual Meeting, an annual series of meetings throughout the country, and also to develop the initiative of the Local Sections by placing responsibility upon them for the inauguration and conduct of technical meetings. The conduct of a Regional Meeting shall be as specified in the Rules. No Regional Meeting shall be considered a Meeting of the Society as a whole.

PAR. 7 The affairs of the Local Sections shall be in general charge of the Standing Committee on Local Sections, under the direction of the Council. This Committee shall be constituted as provided elsewhere in the By-Laws.

Article B12, Publications and Papers

PAR. 1 All publications of the Society shall be in charge of the standing Committee on Publications, under the direction of the Council. All income from and expenditures for publications and all policies in regard to publications shall be controlled by the Council.

PAR. 2 The Record and Index issued each year shall contain the annual report of the Council, an index of the technical papers and discussions and reports of the technical committees and other records of Society activity selected by the Committee on Publications.

PAR. 3 Each member of the Society in good standing on the thirty-first day of December of each year shall be entitled to receive a copy of the Record and Index for that year.

PAR. 4 The Transactions of the Society shall be issued in sections corresponding with the Professional Divisions. Members registered in the Professional Divisions will receive the Transactions of the Divisions in which they are registered.

PAR. 5 *Mechanical Engineering* shall be issued monthly and shall be mailed regularly to each member in good standing.

PAR. 6 *A.S.M.E. News* shall be issued semi-monthly and shall be mailed regularly to each member in good standing.

PAR. 7 The Membership List shall be issued to eaeh member in good standing who makes request for it.

PAR. 8 Papers presented to the Society and papers solicited by any of the committees shall be subject to the procedure specified in the Rules.

Article B13, Secretary

PAR. 1 The Secretary of the Society shall be the Secretary of the Council and of each of the committees.

PAR. 2 The Secretary may take part in the deliberations of the Council, but shall have no vote therein.

PAR. 3 The office of the Secretary shall be open for business, as the Rules prescribe.

PAR. 4 The Secretary may be subject to removal for cause by a vote of fifteen (15) members of the Council at any time, after one (1) month's written notice has been given him to show cause why he should not be removed, and after he has been heard in his own defense, if he so desires.

PAR. 5 The Secretary shall receive a salary which shall be fixed by the Council.

Article B14, Funds

RECEIPTS

PAR. 1 All funds shall be paid in to the Secretary, who shall enter them in the books of the Society, and deposit them to the account of the Treasurer in a bank designated by the Council.

PAR. 2 All bills against members and others shall be made and collected by the Secretary.

PAR. 3 All initiation fees shall upon receipt be deposited in the Reserve Account of the Society, and current expenses shall not be paid out of such Reserves without reference to the Finance Committee and its recommendations to the Council.

PAR. 4 All contributions to the Society for any specific purpose shall be disbursed under the direction of the Council.

PAR. 5 All registration fees collected at Meetings of the Society shall be paid into the general funds and be disbursed under the direction of the Council.

PAR. 6 All gifts or bequests not designated for a specific purpose shall be invested by the Council, and only the income used as directed by the Council.

PAR. 7 All gifts or bequests to the Society designated by the donors for a specific purpose, and all moneys permanently set aside by the Council for specific purposes, shall be invested and either the capital or income as so designated shall be used for that specific purpose for which it was designated.

PAR. 8 In the case of all moneys invested by the Council for permanent or temporary purposes, the Secretary of the Society shall at the close of each fiscal year compute the interest and return received for the year on the Society's invested funds. The Secretary shall determine an average rate of income and shall recommend an apportionment of such return to each of the several funds for which investment is made. Upon approval and order of the Council these apportioned returns shall be duly entered in the books of account of the Society as the income for the year on the various funds.

PAR. 9 At the discretion of the Council income from any fund may be allowed to accumulate for expenditure in any subsequent year, or the income may be added to the original fund and invested with it. But, in no case may the Council expend moneys from such specially designated funds, either from capital or from income duly apportioned as detailed in paragraph 8, for the current expenses of the Society.

PAR. 10 Upon the maturity of any permanent investment other than trust funds, the Treasurer and Finance Committee are required to reinvest such funds unless instructed and authorized to the contrary by the Council.

PAR. 11 The securities of the Society, either principal or trust funds, may be sold, bought, or exchanged upon the written order of the Treasurer, the

Secretary, and the Chairman of the Finance Committee, and these three signatures must appear on any order to any broker, bank, or company. If any one or two of these officers be temporarily unavailable, then an equal number of members of the Executive Committee may be substituted.

EXPENDITURES

PAR. 12 All expenditures shall be subject to the approval of Council and shall be made in accordance with the annual budget of appropriations as finally adopted by the Council at the beginning of each fiscal year, as provided in the Rules.

PAR. 13 Any obligations which may be incurred during the fiscal year and which will require the expenditure of the Society's funds outside of appropriations made by the Council in the approved annual budget shall first be referred to the Finance Committee for report by that Committee back to the Council.

PAR. 14 The Secretary shall report to the Council each month the total obligations incurred against each appropriation, together with the amount of each appropriation which is unexpended.

PAR. 15 The annual appropriations approved by the Council, or so much thereof as may be required for the work of the Society, shall be expended by the Secretary, under direction of the committees.

PAR. 16 All bills against the Society shall be in charge of the Secretary who shall present them in proper form to the Finance Committee for audit, as provided in the Rules.

PAR. 17 Funds of the Society shall be paid out only upon vouchers duly signed by the Secretary and audited by the Finance Committee under the direction of the Council.

Article B15, Professional Practice

PAR. 1 All members of the Society shall subscribe to the following Code of Ethics, as required by the Constitution:

A CODE OF ETHICS FOR ENGINEERS

Engineering work has become an increasingly important factor in the progress of civilization and in the welfare of the community. The engineering profession is held responsible for the planning, construction and operation of such work and is entitled to the position and authority which will enable it to discharge this responsibility and to render effective service to humanity.

That the dignity of their chosen profession may be maintained, it is the duty of all engineers to conduct themselves according to the principles of the following Code of Ethics:

1 The Engineer will carry on his professional work in a spirit of fairness to employees and contractors, fidelity to clients and employers, loyalty to his country and devotion to high ideals of courtesy and personal honor.

2 He will refrain from associating himself with or allowing the use of his name by an enterprise of questionable character.

3 He will advertise only in a dignified manner, being careful to avoid misleading statements.

4 He will regard as confidential any information obtained by him as to the business affairs and technical methods or processes of a client or employer.

5 He will inform a client or employer of any business connections, interests or affiliations which might influence his judgment or impair the disinterested quality of his services.

6 He will refrain from using any improper or questionable methods of soliciting professional work and will decline to pay or to accept commissions for securing such work.

7 He will accept compensation, financial or otherwise, for a particular service, from one (1) source only, except with the full knowledge and consent of all interested parties.

8 He will not use unfair means to win professional advancement or to injure the chances of another engineer to secure and hold employment.

9 He will cooperate in upholding the Engineering Profession by exchanging general information and experience with his fellow engineers and students of engineering and also by contributing to the work of engineering societies, schools of applied science and the technical press.

10 He will interest himself in the public welfare in behalf of which he will be ready to apply his special knowledge, skill and training for the use and benefit of mankind.

Article B16, Amendments to the Constitution

PAR. 1 At least fourteen (14) days before the closing of a ballot on an amendment to the Constitution, the President shall appoint three (3) Tellers of Election on Amendments, whose duty it shall be to canvass the votes cast, as detailed in the Rules.

PAR. 2 The Tellers shall canvass the ballots and shall certify the result to the Presiding Officer at the Meeting of the Society at which the result is to be announced.

PAR. 3 In the case of a tie vote on an amendment, the Presiding Officer at the Meeting of the Society shall cast the deciding vote.

PAR. 4 The terms of office of the Tellers shall expire when their report of the canvass has been presented and accepted.

RULES

Article R2, Objects

RULE 1 The Council may approve the affiliation with the Society of any engineering society or legally organized group of engineers whose objects are in accord with the traditions, precedents and objects of this Society.

RULE 2 The term "Affiliated with The American Society of Mechanical Engineers" shall be used by any society or by individual members of it only while the respective governing boards of both societies continue the affiliation.

RULE 3 Affiliation with this Society of any other organization shall in no wise be interpreted as interfering with the independence, autonomy and self-control of that organization under its own Constitution or By-Laws.

RULE 4 The Society shall not be responsible for any act of any affiliated society.

RULE 5 Affiliation with this Society of any other organization may be terminated by the governing board of either giving sixty (60) days' written notice to the governing board of the other.

Article R3, Membership

RULE 1 Each member shall be entitled to a certificate of membership, signed by the President and Secretary of the Society; it shall remain the property of the Society and be returned on demand. Each member requesting a certificate shall pay the cost of engrossing.

RULE 2 Each proxy authorizing a person to vote for a member shall be signed, with an attesting witness, by the member giving it and submitted to the Secretary for verification of the right of the member to vote at the meeting at which the proxy is to be used.

RULE 3 Abbreviations of the titles to be used by members are as follows:

Honorary Member	Hon. Mem. A. S. M. E.
Member	Mem. A. S. M. E.
Associate	Assoc. A. S. M. E.
Associate-Member	Assoc-Mem. A. S. M. E.
Junior	Jun. A. S. M. E.

RULE 4 The emblem approved by the Council for each grade of membership shall be used only by those who belong to that grade.

RULE 5 Each resignation presented to the Council after the fiscal year has commenced (October first) must be accompanied by a statement from the Secretary that the member has paid his dues up to and including that portion of the current fiscal year, unless such resignation is presented by January first, when no payment of current dues shall be required.

RULE 6 Each member desiring to resign shall deposit with the Secretary any badge and certificate of membership in his possession, and upon acceptance of his resignation the Secretary shall make him the stipulated refund for his badge.

Article R4, Qualifications for Admission

RULE 1 A candidate for admission to the Society as a Member, Associate or Associate-Member must refer to at least five (5) members who have personal knowledge of his qualifications.

RULE 2 A candidate for admission to the Society as a Junior must refer to at least three (3) members who have personal knowledge of his qualifications.

RULE 3 An application for membership from a candidate who may not be able to give the necessary number of references may be recommended to the Council for ballot after sufficient evidence has been secured to show that the candidate is worthy of admission to membership. Such candidates may refer to officers or voting members of other societies of like standing.

RULE 4 Each application may be referred by the Membership Committee to the Executive Committee of the Local Section to which the applicant would be logically attached, for information and comment by such Local Committee. If, after a period of twenty (20) days no comment is received from the Local Committee, the Membership Committee will proceed with the consideration of the application.

RULE 5 The references for each candidate shall be requested to make such confidential communications to the Membership Committee as will enable it to arrive at a proper estimate of the eligibility of the candidate.

RULE 6 The Membership Committee shall report to each session of the Council the names of all candidates together with the recommendation of the Committee on each. The Committee shall meet monthly to receive and scrutinize all applications, and shall seek further information as to the qualification of a candidate whose evidence of eligibility is not clear to them.

RULE 7 The Membership Committee shall at once destroy all correspondence in relation to each candidate when his name has been placed on ballot by order of the Council, or upon the withdrawal of the application.

RULE 8 The Secretary shall mail to each member of the Council a ballot of the names and respective grades of the candidates for membership approved by the Membership Committee after having been duly posted in the publications of the Society. The voter shall prepare his ballot by crossing out the name of any candidate rejected by him, and shall enclose the ballot in an envelope and seal it. He shall enclose this envelope in a second envelope and sign it for identification. A ballot without the autographic endorsement of the voter on the outer envelope is defective and shall be rejected.

RULE 9 The Secretary shall count the ballots cast by the Council for election of new members, notify the applicants of their election, and regularly report the results of the ballot at the Council meeting next following each election. The names of applicants who are not elected shall neither be announced nor recorded.

Article R5, Fees and Dues

RULE 1 A Student Associate making application for membership within one (1) year of the date of his graduation shall be excused by the Council from the payment of dues for one (1) year from date of election.

RULE 2 In accordance with B5, Par. 11, the Council shall permanently exempt from dues any member of the Society who has paid dues for thirty-five (35) years, or who shall have reached the age of seventy (70) years after having paid dues for thirty (30) years.

Article R6, Nominating Committees

RULE 1 For the purpose of nominating members of the Regular Nominating Committee, the committee on Local Sections shall, on or before the first day of October of each year, associate the Local Sections into seven (7) groups, each group to be responsible for nominating one (1) member of the Committee. The Sections which will comprise these groups shall, as far as possible, be contiguous geographically to each other.

RULE 2 The assignment of the Local Sections to such groups shall be announced at the Conference of Local Sections Delegates held at the Annual Meeting.

RULE 3 Each member of the Society entitled to vote shall be assigned to one of the seven (7) groups of Local Sections for the purpose of the election of the Regular Nominating Committee.

RULE 4 Each Local Section, except as quoted in Rule 5, shall be entitled to one (1) delegate to the Conference of Local Sections Delegates for the purpose of the selection of the Regular Nominating Committee, and shall be entitled to one (1) vote in the Conference in the selection of the member of the Committee nominated to represent its group of Sections.

RULE 5 In a case in which a Local Section is divided into branches, the Section shall not have a delegate, but each branch shall be entitled to a delegate with one (1) vote.

RULE 6 At the time of the announcement of the groups the Chairman of the Committee on Local Sections shall designate one (1) member of each group to call it together for organization. The result of the actions taken by the groups shall be submitted to the Conference of Local Sections Delegates for action.

RULE 7 The Chairman of the Committee on Local Sections, or in his absence, the senior member of the Committee, shall preside at the Conference of Local Sections Delegates at the time action is taken on the Regular Nominating Committee.

RULE 8 At the Business Session of the Annual Meeting of the Society, the Chairman of the Local Sections Conference shall present names recommended by the Conference for the Regular Nominating Committee.

Article R7, Directors (Council)

RULE 1 The names of the candidates proposed by the Regular Nominating Committee and by any other nominating committee, and the respective offices for which they are candidates, shall be printed in separate lists on the same ballot sheet, each list of candidates to be printed under the names of the members of the particular committee which proposed it.

RULE 2 Each list of names shall contain the name of only one (1) candidate for the office of President. For any other office than President, there may be more than one (1) candidate.

RULE 3 In the election of Directors, the voter shall prepare his ballot by crossing out the name of any candidate or candidates rejected by him and may write in the name of any eligible member of the Society, and shall enclose the ballot in an envelope and seal it. He shall then enclose this envelope in a second envelope marked "Ballot for Directors" and seal it, and he shall then write his name thereon for identification.

RULE 4 The Tellers shall not receive any ballot after the stated time for the closure of the voting.

RULE 5 The Secretary shall certify to the competency and signature of all voters.

RULE 6 The Tellers shall open and destroy the outer envelopes and then open the inner envelopes and canvass the results.

RULE 7 A ballot without the autographic endorsement of the voter on the outside envelope is defective and shall be rejected by the Tellers of Election.

RULE 8 A ballot containing more names than there are offices to be filled is defective and shall be rejected by the Tellers.

RULE 9 In counting the ballots for officers, the Tellers shall consider a ballot for any officer as valid providing the intent of the voter as to that particular office is clear, even though his ballot as to candidates for another office may for any reason be invalid.

Article R8, Council

Reports of Standing Administrative Committees

Rule 1 Table of procedure for reports.

STANDING COMMITTEES

Finance; Meetings and Program; Publications; Membership; Professional Divisions; Local Sections; Constitution and By-Laws; Awards; Relations with Colleges; Education and Training for the Industries; Library.

These are always Annual Reports:

Two (2) copies submitted to Secretary of Society preferably by September 15, one (1) copy signed by members of committee, with or without reservations.

Manifolded and mailed to Council preferably by September 29, for examination previous to call for vote.

At October meeting, Council votes to receive report and incorporate it in its own records and in its own Annual Report to Society.

Presented to Society with Council report at Annual Business Meeting, first week in December.

Submitted to Publications Committee for printing in the Record and Index and/or *Mechanical Engineering*.

SPECIAL COUNCIL COMMITTEES

Any Special Committee the Council may appoint.

Annual Reports:

Two (2) copies submitted to Secretary of Society preferably by September 15, one (1) copy signed by members of committee, with or without reservations.

Manifolded and mailed to Council preferably by September 29, for examination previous to call for vote.

At October meeting, Council votes to receive report, and incorporate it in its own records and in its own Annual Report to Society.

Presented to Society with Council report at Annual Business Meeting, first week in December.

Submitted to Publications Committee for printing in the Record and Index and/or *Mechanical Engineering*.

Final Reports:

Two (2) copies submitted to Secretary of Society, one (1) copy signed by members of committee with or without reservations.

Manifolded and mailed to Council for examination previous to call for vote.

At next meeting, Council votes to receive report, incorporate it in its own records, and discharge committee with thanks.

Presented to Society at following Business Meeting (Annual or Semi-Annual).

Submitted to Publications Committee for printing in the Record and Index and/or publication in pamphlet form for general distribution.

Reports of Standing Professional Committees

Rule 2 Table of procedure for reports.

STANDING COMMITTEES

Research; Standardization, Power Test Codes—Main Committee; Safety; Professional Conduct.

These are always Annual Reports:

Two (2) copies submitted to Secretary of Society preferably by September 15, one (1) copy signed by members of committee, with or without reservations.

Manifolded and mailed to Council preferably by September 29, for examination previous to call for vote.

At October meeting, Council votes to receive report and incorporate it in its own records and in its own Annual Report to Society.

Presented to Society with Council report at Annual Business Meeting, first week in December.

Submitted to Publications Committee for printing in the Record and Index and/or *Mechanical Engineering.*

SPECIAL COMMITTEES

Research Committees (Bearing Metals, Lubrication, Flow Meters, and the like); Boiler Code; Power Test Codes—Individual Committees.

Annual Reports:

Two (2) copies submitted to Secretary of Society preferably by September 15, one (1) copy signed by members of committee, with or without reservations.

Manifolded and mailed to Council preferably by September 29, for examination previous to call for vote.

At October meeting, Council votes to receive report, and incorporate it in its own records and in its own Annual Report to Society.

Presented to Society with Council report at Annual Business Meeting, first week in December.

Submitted to Publications Committee for printing in the Record and Index and/or *Mechanical Engineering.*

A.S.M.E. Special Committees—Final Reports:

Two (2) copies submitted to Secretary of Society, one (1) copy signed by committee, with or without reservations.

Manifolded and mailed to selected list, including Council, for criticism and suggestions.

Referred back to Committee for consideration of criticism and suggestions.

Revised copy submitted to Executive Committee of Council for examination, with letter-ballot.

Executive Committee of Council may vote (1) to receive it without printing, (2) refer it back to committee.

If voted by Executive Committee, it is printed in *Mechanical Engineering* for criticism and suggestions.

Presented for discussion at Business Meeting of Society or at public hearing. This open discussion must be fully advertised and a general invitation to attend extended to all persons and recognized organizations affected.

Written discussion from above carefully considered by Committee and report again revised if necessary.

Final draft submitted to any other committees of Council concerned for review and recommendations to Council if necessary.

Submitted to Council, with letter-ballot, for final approval and adoption as to form and substance.

Submitted to Publications Committee for printing in the Record and Index and/or publication in pamphlet form for general distribution.

A.S.A. Sectional Committees—Final Reports:

Twelve (12) copies submitted to Secretary of Society, one (1) copy signed by Sectional Committee, with or without reservations.

Mailed to A. S. M. E. Standardization Committee, for study and recommendations to Executive Committee of Council.

Mailed to Executive Committee of Council for examination, with letter-ballot.

Executive Committee of Council may vote (1) to receive it for A.S.M.E., (2) order its printing in *Mechanical Engineering* in full or abstract.

If voted by Executive Committee, it is printed in *Mechanical Engineering* for criticism and suggestions.

Reprints mailed to interested

(1) organizations

(2) firms

(3) individuals

with request for criticisms and suggestions.

At the discretion of the A.S.M.E. Standardization Committee, public hearings may also be arranged.

Returned to Sectional Committee with the criticisms and suggestions.

Sectional Committee votes on revised draft, and submits two (2) copies to each sponsor, with a complete record of the vote.

Copies of revised report, standard or code, mailed to every member of Council, with letter-ballot.

On approval by Council and governing boards of other sponsors, it is submitted to A.S.A. for approval as an American Standard or Tentative American Standard.

Reprinted in pamphlet form for sale by A.S.A. and the sponsors. Latter provide fifty (50) copies for free distribution to other standardizing bodies.

Article R8 (*cont.*)

AMERICAN ENGINEERING COUNCIL

RULE 3 The President of the Society in office shall be the Chairman of the delegation of this Society to the Meetings of the American Engineering Council, and the chairman of the A.S.M.E. representatives on the Executive Board.

Article R9, Meetings of the Society

RULE 1 Announcements of all Meeting of the Society shall be made in the publications. A notice of each meeting shall be given by the Secretary to each member not less than thirty (30) days before the date of that meeting.

RULE 2 The conduct of the professional and business sessions at any Meeting of the Society shall be in charge of presiding officers and assisting committees, appointed by the Meetings and Program Committee with the advice and consent of the President.

RULE 3 The features of the program outside of the professional and business sessions at any Meeting of the Society in any city shall be in charge of a committee appointed or designated by the Committee on Meetings and Program.

RULE 4 At the opening of every meeting the Chairman shall announce the definite amount of time allotted by the Committee on Meetings and Program for the presentation and discussion of each paper.

Article R10, Professional Divisions

RULE 1 When a number of members of the Society interested in a particular branch of the work of the Society favor the formation of a Professional Division for that branch, they may draw up a petition for the establishment of such a Division. Each such petition shall be sent to the Standing Committee on Professional Divisions for presentation to the Council with its recommendation. Upon approval of the petition by the Council, the Chairman of the Standing Committee on Professional Divisions shall appoint a temporary Chairman of the new Division.

RULE 2 The Executive Committee of each Professional Division shall consist of five (5) members and the term of one (1) member shall expire at the close of each Annual Meeting. Such officers as the Division may require shall be selected from the membership of the Society. Other committees of the Division shall be appointed by the Executive Committee as required.

RULE 3 Upon the organization of a Professional Division the initial selection of the Executive Committee shall be made by the President upon the nomination of the Standing Committee on Professional Divisions which will state the length of term of each appointee.

RULE 4 During the month of October of each year the Executive Committee of each Division will nominate to the President through the Standing Com-

mittee on Professional Divisions one or more individuals from whom the President shall appoint the member of the Executive Committee.

RULE 5 The Executive Committee of each Professional Division shall elect its own officers. No one shall be eligible for chairmanship until he has been a member of this committee for one year, except in the selection of the Executive Committee for a newly formed Division.

RULE 6 In case of resignation or decease, vacancies shall be filled by appointment of the Executive Committee subject to the approval of the President of the Society.

RULE 7 The Executive Committee may, subject to the approval of the Secretary of the Society, appoint or elect a Secretary of the Division, who shall report the proceedings of that Division to the Secretary of the Society for notice in the publications. He shall perform the duties of Secretary of the Division, and such other duties as may be prescribed by the Executive Committee.

RULE 8 Any expenditure for the purpose of a Division chargeable to the Society must be authorized by the Secretary of the Society before it is incurred, and must be provided for in the annual budget approved by the Council. Any liability otherwise incurred shall not be binding on the Society, and must be met by the Division itself.

RULE 9 Notice of all Professional Division meetings shall be given in writing to the Secretary of the Society and to the Chairman of the Standing Committee on Professional Divisions at least six (6) weeks in advance of the date set for such meetings.

PROFESSIONAL GROUPS

RULE 10 The functions and responsibilities of a Professional Group shall be the same as those of a Professional Division, except that the Chairman of the Executive Committee, although having a seat in the conferences of the Chairmen of the Professional Divisions, shall have no vote.

RULE 11 The activities of a Professional Group shall be subject to the jurisdiction of the Standing Committee on Professional Divisions.

RULE 12 The Council reserves the right to disband any Professional Group on sixty (60) days' notice.

Article R11, Local Sections

RULE 1 When a number of members of the Society in any territory within the limits of North America, Hawaii, Porto Rico, and Cuba favor the formation of a Local Section in that territory, a preliminary meeting shall be called and notice sent to the entire membership of the Society residing in that territory. At this meeting a petition for the formation of a Local Section, containing suggestions as to the territory to be included in the Section, may be presented, and, if adopted, shall be sent to the Standing Committee on Local Sections for recommendation to the Council.

RULE 2 Upon the approval by the Council of the petition, a meeting of the signers shall be held for the selection of a temporary Executive Committee of at least five (5) members. This Committee shall have charge of, and be responsible for, the proceedings of the Local Section until the next election of officers.

RULE 3 The Executive Committee of a Local Section shall consist of a Chairman, a Secretary, and such other officers as may be found desirable. Such officers shall be elected by ballot of the members of the Society constituting the Section. The Committee shall be elected before the first day of June each year and shall take office on the first day of July.

RULE 4 A member of the Society shall be entitled to vote or to hold office in not more than one (1) Local Section at a time.

RULE 5 The Chairman of each Local Section shall have the privilege of attending all meetings of the Standing Committee on Local Sections.

RULE 6 The Secretary of each Local Section shall report the proceedings of that Section to the Secretary of the Society for notice in the publications. He shall discharge the duties of Secretary of the Section, and such other responsibilities as may be prescribed by the Executive Committee.

RULE 7 Any expenditure chargeable to the Society for the purpose of any Local Section must be provided for in the annual budget approved by the Council. No liability otherwise incurred shall be binding upon the Society.

RULE 8 Each Local Section shall have the privilege of representation at the Annual Meeting of the Society by one (1) official delegate. Such delegate, the Chairman, if possible, may have such portion of his expenses for transportation to the meeting refunded by the Society as the Committee on Local Sections may direct.

RULE 9 Each Local Section shall use only such uniform stationery as is supplied by the Secretary of the Society.

RULE 10 For the convenient cooperation between the Local Sections and the Professional Divisions, each Local Section may appoint an individual or a committee to act as a correspondent with each Professional Division, with duties that will comprise generally the arranging with the Professional Division for the presentation of papers, holding of meetings, etc., within that particular Local Section, and as far as possible, to act as a means of furnishing information, secured within the Local Section, which might prove of interest to the Division.

RULE 11 A Local Section may affiliate with existing local engineering organizations, or form jointly with them new local engineering organizations, but the plan of such affiliation or organization, and the obligations assumed by the Local Section and the Society thereby, shall first be approved by the Council. Any expenditures incurred in such an affiliation shall be binding only on the Section and not on the Society as a whole.

RULE 12 A Local Section may arrange to hold joint meetings with other engineering organizations and may invite members of such organizations to attend its meetings, but all expenses incurred shall be binding only on the Section and not on the Society as a whole.

RULE 13 Each Local Section may adopt its own by-laws, for the conduct of its affairs, provided such are in harmony with the Constitution, By-Laws and Rules of the Society, and provided also every publication of such by-laws be prefaced with a copy of this Rule.

RULE 14 The Council of the Society, on sixty (60) days' notice, may suspend or disband any Local Section.

RULE 15 Groups of members residing outside the limits of North America, Hawaii, Porto Rico, and Cuba may engage in group activities with local members of the A.S.C.E., A.I.M.E., and A.I.E.E., in which case the Council may grant them nominal financial support, provided such group action is not in conflict with the policies and activities of any established national engineering societies in such foreign countries, and that such groups cooperate as permitted with such foreign societies.

REGIONAL MEETINGS

RULE 16 A Regional Meeting may be held upon petition to the Council of a group of Local Sections. Such a petition must bear the signatures of the Chairman or their representatives on the Executive Committees of the Local Sections proposing to participate in the meeting.

RULE 17 The principal means for accomplishing the object of Regional Meetings shall be the presentation and discussion of technical papers; industrial visits, excursions and entertainments may also be provided.

RULE 18 The plan of procedure for organizing and conducting a Regional Meeting shall be as determined from time to time by the Standing Committees on Local Sections and on Meetings and Program, which shall jointly make recommendations to the Council on all matters affecting Regional Meetings.

RULE 19 The place of a Regional Meeting shall be determined by the Council upon the concurrent recommendation of the Standing Committees on Local Sections and on Meetings and Program.

RULE 20 Following the completion of the preliminary arrangements, each Regional Meeting shall be under the jurisdiction of the Committee on Meetings and Program. The Local Sections participating in the meeting shall appoint a special local committee to conduct the meeting, which committee shall act as a sub-committee of the Committee on Meetings and Program.

RULE 21 Papers for presentation at Regional Meetings are subject to the rules governing presentation of papers before the Society, enumerated elsewhere in the Rules.

RULE 22 Notice of a Regional Meeting shall be published by the Secretary of the Society at least six (6) weeks in advance of the date of the meeting.

RULE 23 Cooperation with other national and local engineering societies in a Regional Meeting shall be encouraged. Preliminary arrangements for such cooperation shall be made through the Standing Committee on Local Sections, but official conclusions of any preliminary arrangements must be made by the respective secretaries of the national and local societies participating.

RULE 24 No Regional Meeting shall be considered as a Meeting of the Society as a whole, and no business of the Society may be transacted at such a meeting.

STUDENT BRANCHES, ASSOCIATE STUDENT SOCIETIES, AND ENROLLED STUDENTS

RULE 25 A group of students in an Engineering School may petition the Council for the formation of a Student Branch of the Society if the Engineering School conforms to the following requirements:

(*a*) A preparation for entrance of four (4) years at high school or its equivalent.

(*b*) An adequate staff for teaching mechanical engineering.

(*c*) At least one (1) member of the faculty a member of The American Society of Mechanical Engineers.

(*d*) An equipment of buildings and laboratories sufficient to make possible a responsible professional course in mechanical engineering.

(*e*) A course of studies covering all subjects ordinarily required to enable a graduate to begin a career in engineering. Members of Student Branches shall be known as Student Associates.

RULE 26 (*a*) A group of Student Associates interested in mechanical engineering may petition the Council for the formation of a Student Branch of the Society. [Heretofore, fifteen (15) has been the usual minimum number in such a group] or

(*b*) Established Student Engineering Societies in schools or colleges of accepted standing may petition the Council for association with the Society. Mechanical engineering students in such Societies shall also be regarded as Student Associates of the Society.

RULE 27 An application for a Student Branch, or an association by a Student Engineering Society, must be made to the Secretary of the Society. Such applications will be referred to the Standing Committee on Relations with Colleges, and by it reported to the Council for final action. The application should indicate clearly the number of teachers of mechanical engineering, the laboratory facilities, in a general way, and the number of mechanical engineering students. A catalogue of the college should accompany the application.

RULE 28 The name of a Student Branch affiliated with the Society shall be the . . . . Student Branch of The American Society of Mechanical Engineers.

RULE 29 Each Student Branch shall be autonomous, subject to such limitation as may be set by the Constitution, By-Laws and Rules of the Society, and the Council.

RULE 30 So far as practicable, each Student Branch shall, through its secretary, furnish to the Secretary of the Society for notice in the publications, reports of meetings held and business transacted.

RULE 31 Upon recommendation of each Student Branch, the President of the Society shall designate a member of the Society to be Honorary Chairman of the Student Branch for each year. The Honorary Chairman shall be *ex-officio* a member of the governing body of the Student Branch.

RULE 32 The presiding officer chosen by each Student Branch shall be styled the Chairman of the . . . . Student Branch of The American Society of Mechanical Engineers.

RULE 33 The Committee under whose management the affairs of the Student Branch are conducted shall have at least three (3) members in addition to the Honorary Chairman. The names shall be communicated to the Secretary of the Society.

RULE 34 The names of committees of the Student Branches and papers or stationery must bear the words " Student Branch."

RULE 35 Any Student Branch may have printing done by the Society at cost. In case a Student Branch desires to publish any papers in local journals or elsewhere, it should first ascertain that the Society does not itself desire to publish such paper. The privilege of priority in publication shall always be the right of the Society. The Student Branch shall claim no exclusive copyright.

RULE 36 A Student Associate or an Enrolled Student is entitled to the publications of the Society at special rates, as prescribed in the Rules for Papers and Publications.

RULE 37 With a view to assisting graduates in getting acquainted and to enable them without financial burden to secure benefits of the technical meetings of the Society, a member of a Student Branch will upon graduation be enrolled without additional payment as a member of any Local Section of the Society.

RULE 38 The affairs of the Student Branches shall be in general charge of the Standing Committee on Relations with Colleges, in accordance with the By-Laws.

RULE 39 (*a*) Any person registered as a resident student in an engineering course at a university or technical school may be accepted as an enrolled student of The American Society of Mechanical Engineers as hereinafter provided.

(*b*) Application for admission as an enrolled student of the Society shall be made on a regular form approved by Council. This application shall set forth the name and address of the applicant, the college or university he is attending, the year of expected graduation, and the degree to be granted. It should bear the endorsement of at least one member of the A.S.M.E. or of another engineering society of standing.

(*c*) These applications shall be forwarded to the Headquarters of the Society and passed upon by the Committee on Relations with Colleges.

RULE 40 Each Enrolled Student shall pay an annual fee of $2.50, payable in advance. The period of Student enrollment shall not exceed three years, nor shall it extend more than one and one-half years beyond the date of graduation from, or of leaving the University or Technical School; the period of enrollment shall date from the first of January nearest the date of filing application.

RULE 41 The annual fee of $2.50 paid by each enrolled student shall be applied as a subscription to *Mechanical Engineering* for the year covered by such payment.

Article R12, Publications and Papers

RULE 1

(*A*) The annual subscription price for *Mechanical Engineering* is:

[1] Member	$ 3.00
Member (additional subscription)	4.00
Non-Member in United States	5.00
Non-Member in Canada	5.75
Non-Member in other Foreign Countries	6.50
Library	4.00
Student Associate	2.50
Enrolled Student	3.00

(*B*) The annual subscription price for Transactions as published in sections is:

[1] Member, for three sections	$ 2.00
Non-Member, for each section except Aeronautics, and Fuels and Steam Power	4.00
Non-Member, for Aeronautics Section	5.00
Non-Member, for Fuels and Steam Power Section	8.00

PAPERS

RULE 2 Papers may come to the Society:

(*a*) By voluntary submission by members or non-members.

(*b*) As a result of request of (1) the Standing Committee on Meetings and Program; (2) the Standing Committee on Professional Divisions or a Professional Division; (3) the Standing Committee on Local Sections or a Local Section.

RULE 3 Voluntary papers are classified as those suitable for presentation: (1) at a meeting of the Society, either before a general session or a Professional Division session; (2) at a Regional Meeting; (3) before a Local Section.

RULE 4 All voluntary papers must be sent to the Secretary of the Society, and be submitted by him to the Standing Committee on Meetings and Program. Such papers may be either accepted for presentation at a general session of the Society; referred to the Standing Committee on Professional Divisions; referred to the Standing Committee on Local Sections; or returned to the Secretary for transmission to the author with or without suggestions for modifications and re-submission.

RULE 5 Papers referred to the Standing Committee on Professional Divisions or on Local Sections may be accepted by these committees and referred to a Professional Division, a committee on a Regional Meeting, or a Local Section, for assignment to a session, or, if such assignment cannot be arranged, may be returned to the Secretary for transmission to the author.

RULE 6 Requested papers will in general be suitable for the purpose for which they have been sought, but all such papers intended for presentation at an Annual or Semi-Annual Meeting of the Society must be passed upon by the Standing Committee on Meetings and Program.

RULE 7 Papers requiring advance distribution may be turned over to the Standing Committee on Publications for consideration for advance publication in *Mechanical Engineering*; such copies as are required for distribution may be printed in pamphlet form and an abstract, approved by the Standing Committee on Publications, published in *Mechanical Engineering*.

RULE 8 Papers requiring discussion at a meeting to determine their value and general interest may be accepted for presentation, but shall not be put in type until they have been read and discussed.

RULE 9 All papers accepted for presentation at a Meeting of the Society shall be passed to the Standing Committee on Publications so that, if desired,

[1] For members the subscription price is included in the annual dues.

publication of papers in full or in abstract may be made in *Mechanical Engineering*. Papers may be presented before Regional or Local Section meetings without being passed upon by the Standing Committee on Meetings and Program or referred to the Committee on Publications, but should be sent to those committees afterwards so that they may be available for presentation at a Meeting of the Society or for publication in *Mechanical Engineering*, if such is desirable. Such papers may be given general release to the technical press after presentation under such release date as will permit of simultaneous publication in *Mechanical Engineering*. If prompt publication in *Mechanical Engineering* is not possible, full release will be given to the technical press by the Standing Committee on Publications.

RULE 10 Papers for presentation at the Annual or Semi-Annual Meetings of the Society must be received by the Secretary at the headquarters of the Society at least two (2) months before the date of the meeting at which they are to be presented.

RULE 11 Papers presented at any Meeting of the Society, a Professional Division, a Local Section or a Regional Meeting become the property of the Society and fall under the copyright rule, but may be reprinted by anyone, in part or in full, if the proper credit is given to the author and to the Society.

RULE 12 The Standing Committee on Meetings and Program shall deliver to the Secretary such papers as are selected for presentation to the profession or general sessions of the Society, and he shall have sole possession of papers and illustrations between the time of their approval by the Committee and their presentation to the session.

RULE 13 Members may obtain reprints of papers at a price sufficient to cover the cost to the Society, provided that such copies are not for the purpose of resale. Reprints of papers shall bear the imprint of the Society only.

Article R13, Secretary

RULE 1 The office of the Secretary shall be open on business days from 9 a. m. to 5 p. m.; on Saturdays from 9 a. m. to 1 p. m.

RULE 2 The Secretary shall establish and enforce rules for the conduct of the business of his office.

RULE 3 The Secretary shall have charge of the rooms of the Society and furnishings, the historical relics and objects of art, and shall make suitable recommendations to the Council for their care and use.

Article R14, Funds

RULE 1 The accounts of the Society shall be audited and approved annually by a chartered or other competent public accountant.

RULE 2 The Finance Committee shall hold monthly meetings for the auditing of bills and such other business as shall come before it.

RULE 3 Each year the Finance Committee shall present with its report a detailed estimate of the probable income and expenditures of the Society for the following twelve (12) months.

RULE 4 The Finance Committee shall make recommendations to the Council as to investments, and when called upon by the Council, shall advise upon financial questions.

RULE 5 Any contract or other obligations to pay money in the Society's work, exceeding in amount two hundred dollars ($200), shall be valid only when signed by the Secretary.

Article R15, Professional Practice

RULE 1 The Standing Committee on Professional Conduct, having in charge all matters connected with the Code of Ethics and its enforcement, shall cooperate with similar committees of such other societies as adopt the Code, with the object of carrying out the following procedure:

(*a*) The President of each society cooperating in the Joint Code of Ethics shall appoint a Standing Committee on Professional Conduct to administer the Code of Ethics. The duties of such a Committee shall be to interpret the Code and to render opinions on any cases of questionable conduct on the part of members that may be submitted to the Committee. These interpretations shall be reported to the executive board of the society, which board may approve these interpretations or take such other action as may seem just and necessary. The reports of the Committee on Professional Conduct, when approved by the executive board, shall be printed in abstract and in anonymous form in the Society's monthly Journal for the instruction and guidance of fellow members.

(*b*) This Committee on Professional Conduct shall be appointed in each society by the President holding office at the time of the adoption of this Code and shall consist of five (5) members, one (1) appointed for five (5) years, one (1) for four (4) years, a third for three (3) years, a fourth for two (2) years, and a fifth member for one (1) year only. Thereafter, the President then holding office shall appoint one (1) member annually to serve for five (5) years, and shall also fill any vacancies that may occur for the unexpired term of the member who has withdrawn. These appointments shall be made from among the older members of the Society, so that advantage may be taken of their mature experience and judgment. After appointment, the Committee shall elect its own chairman and secretary. The Committee shall have power to secure evidence or other information in any particular case not only from the organizations' own members, but if it should seem desirable, from men in other professions. The Committee may also appoint sub-committees to consider certain cases when deemed necessary.

(*c*) This Committee shall investigate all complaints submitted to it by the Secretary of the Society bearing upon the professional conduct of any member and after the member involved has been given a fair opportunity to be heard, the Committee shall report its findings to the executive board of the Society. This report may suggest certain procedure of the executive board.

(*d*) The executive board of the Society shall have power to act on the recommendation of the Committee on Professional Conduct, either (1) to censure by letter the conduct of the member who has acted contrary to the Code, if the breach is of minor character, or (2) to cause the member's name to be stricken from the roll of the Society.

(*e*) Copies of all reports made by a Committee on Professional Conduct to the executive board of each society shall be furnished to each of the other Committees on Professional Conduct administering the Code. This will keep each Committee advised of the interpretations of other Committees, and in time an extended interpretation of the Code can be written based on the reports of the various Committees on Professional Conduct.

(*f*) As interpretations of the various Committees on Professional Conduct administering this Code may vary at times, it is recommended that the Chairmen of these committees of the various societies be authorized to act as a Joint Committee to review such differing interpretations and to bring them into harmony with one another.

RULE 2 The standing Committee on Professional Conduct shall follow the procedure below in considering cases presented to it:

(*a*) Cases for consideration may be:

(1) An interpretation of the code, or
(2) Rendering an opinion on the questionable conduct of a member of the Society.

(*b*) Cases and complaints are to be submitted to the Committee by the Secretary of the Society. If any cases or complaints come directly to the Committee, the Secretary of the Society is to be notified by the Secretary of the Committee so that records of the former will be complete.

(*c*) Before a case is submitted to the Committee, the Secretary of the Society shall ascertain whether the person against whom a complaint has been made is a member of the Society, and if possible decide whether the case is of such importance as to be passed on by the Committee, or is of a trivial nature.

(*d*) A case may be submitted by the Secretary of the Society either through the Chairman or the Secretary of the Committee, or jointly to each member of the Committee.

(*e*) On receipt of a case the Committee shall decide whether it can best make a finding by correspondence, or by a meeting of the Committee, and whether hearings shall be given to the interested parties.

(*f*) The Committee may appoint sub-committees to consider and report on cases too remote for the main Committee to act upon.

(*g*) All correspondence from members of the Committee should pass through the office of the Chairman or Secretary of the Committee and not be sent direct to the Secretary of the Society. In order to facilitate filing and preparation of reports, a letter should cover only one case or subject.

(*h*) Reports and findings on cases shall be sent by the Chairman or Secretary of the Committee to the Secretary of the Society for consideration by the Executive Committee or Council of the Society, which may approve the findings or take such other action as may seem desirable or necessary.

(*i*) The Committee may, if it so desires, suggest action by the Executive Committee or Council.

(*j*) Under the plan laid down by the Joint Committee on Code of Ethics, the Executive Committee or Council shall have the power on recommendation of Committee, either (1) to censure by letter the conduct of a member who has acted contrary to the Code, if the breach is of a minor character, or (2) to cause the member's name to be stricken from the rolls of the Society.

Article R16, Amendments to the Constitution

RULE 1 In voting on an amendment to the Constitution the voter shall prepare his ballot by crossing out that part of the amendment which he wishes to vote against. He shall then enclose the ballot in an envelope and seal it, and shall enclose this envelope in a second envelope marked "Ballot on Amendment" and seal it, and he shall then write his name thereon for identification.

RULE 2 The Tellers shall not receive any ballot after the stated time for the closure of the voting.

RULE 3 The Secretary shall certify to the competency and signature of all voters.

RULE 4 The Tellers shall open and destroy the outer envelopes and then open the inner envelopes and canvass the results.

RULE 5 A ballot without the autographic endorsement of the voter on the outside envelope is defective and shall be rejected by the Tellers.

RULE 6 The Tellers shall consider a ballot as valid provided the intent of the voter is clear, and provided also that he conforms with the regulations for voting.

APPENDICES TO THE RULES

Appendix 1, Research Contributions [1]

By special action of the Council, September 25, 1922, and in accord with B14, Par. 4, funds may be solicited from sources outside the Society for the conduct of research. The special Rules adopted by the Council are:

(*a*) The Council favors and strongly urges the closest possible cooperation with universities and technical schools qualified and equipped to assist in the development and conduct of special research work.

(*b*) Cooperative, not competitive, methods should be worked out with existing research laboratories and activities in other organizations. Such cooperation could take the form of publication of papers and groups of papers where a definite industry desires to bring to the attention of engineers for the development of the industry, any problem or special research, without commercial bias.

(*c*) Each suggested research must be presented, on its individual merit, for approval by the Council, which will in turn refer the matter to the appropriate authority or committee.

(*d*) Specific requests to the Council are to be accompanied with full details of proposed scope, method of solicitation of funds and budget.

(*e*) No exception shall be made to the Society's being the custodian of all funds, and having complete knowledge and control of the distribution and assignment of such funds, through the Council, with the understanding always that no contributor is to be specially favored on account of any contribution for a research in which he is interested and that such contribution can be received only on the basis of general benefit to the industry.

Appendix 2, Awards and Prizes

"AWARDS" are bestowed by the Society on the recommendation of the Committee on Awards, approved by Council.

"PRIZES" may be established by Professional Divisions, Local Sections, or other agency within the Society.

NOTE: It is not obligatory on the Society to bestow any award if the character of the paper or inventions considered does not have the distinction that will warrant general recognition by the engineering profession.

1 *Honorary Membership,* only by unanimous vote of the Council, as provided in the Constitution and By-Laws. Candidates for Honorary Membership may be nominated to the Council by not less than twenty-five (25) members. In all cases the grounds upon which the nomination is made must be presented to the Council in writing.

The ordinary procedure in connection with voting upon on Honorary Member is that some member of the Society or a committee submit the name informally to all the members of the Council, not for the purpose of obtaining a final vote, but to ascertain whether the final vote will be unanimous or not. The final vote must be by letter-ballot sent out by the Secretary of the Society and one (1) dissenting vote will be a rejection. It will not be customary to ask for a ballot until after the informal inquiry has been made.

2 *A.S.M.E. Medal,* for distinguished service in engineering and science. This medal may be awarded for general service in science having possible application in engineering.

Any member of the Society presenting the name of an engineer for the award of this medal shall forward a full statement of the grounds upon which the award might be expected, such statement to be published in *Mechanical Engineering,* or the award may be "as prescribed by Council," as noted in B8 (23). In no case, unless prescribed by Council, will an award be made until (1) the invention or improvement shall have been fully described in *Mechanical Engineering* for a period of thirty (30) days, and (2) a favorable recommendation by the Committee on Awards arrived at after the lapse of said thirty

[1] Adopted by Council, May 29, 1923.

(30) days, and (3) a two-thirds vote of the Council at any regular or special meeting. Ordinarily only one (1) such medal a year will be awarded and that only for inventions and improvements of great merit in the technical and public sense. It is not required that this recipient shall be a member of the Society.

3 *Melville Medal,* instituted and endowed by Rear-Admiral George W. Melville, Honorary Member and Past-President of the Society, to encourage excellence in papers, for an original paper or thesis of exceptional merit, presented to the Society for discussion and publication.

4 *Junior Award,* a medal or monetary award, for the best paper or thesis submitted by a Junior Member, under the rules governing such awards.

5 *Student Awards,* two medals or monetary awards, for the best two papers or theses submitted by Student Associates or Enrolled Students, under the rules governing such awards.

6 *Prizes:* The Professional Divisions or the Local Sections or any other agency in the Society may establish and award prizes but these prizes shall not be considered as honors bestowed by the Society as a whole and shall be designated as prizes bestowed by the Professional Divisions, or Local Sections, or any other agency.

7 *Holley Medal,* instituted and endowed in 1924 by George I. Rockwood, Past Vice-President of the Society; to be bestowed for some great and unique act of genius of engineering nature that has accomplished a great and timely public benefit; to be awarded under the provisions of the deed of gift as accepted by Council December 5, 1924.

(*See also Funds Available, on following page*)

Junior and Student Awards

The following rules govern the distribution of these awards:

AWARDS FOR JUNIOR MEMBERS

(*a*) The competition for the award shall be restricted to the Junior Members of the Society.

(*b*) The award shall consist of a cash amount, with an engraved certificate signed by the President and Secretary of the Society.

(*c*) The award shall be bestowed for the paper, adjudged from the standpoints of originality of matter, applicability (practical or theoretical), and value as a contribution to mechanical enginering literature, logical development of contents, conclusiveness, completeness and conciseness.

(*d*) Papers to be eligible for competition shall have been produced by their authors without assistance, and shall not have been previously contributed to nor published by any other society or technical publication in whole or in part. Presentation before a meeting of, or publication by, this Society during the year of the competition shall not be construed as making a paper ineligible.

e) The papers considered shall include all papers presented to the Society by Junior Members during the year ending June 30.

(*f*) The Committee on Awards shall report its recommendation to the Council on or before October 1; the findings of the Committee shall be final. The award shall be bestowed by the Council. The awards shall be announced at the Annual Meeting and shall also be published in the Record and Index.

AWARDS FOR STUDENT ASSOCIATES AND ENROLLED STUDENTS

(*a*) The competition for the awards shall be restricted to Student Associates and Enrolled Students in good standing.

(*b*) The two awards bestowed each year shall consist of a cash amount with an engraved certificate signed by the President and the Secretary of the Society.

(*c*) The awards shall be bestowed for two papers, adjudged from the standpoint of applicability (practical or theoretical), and value as a contribution to mechanical engineering literature, completeness, originality of matter, and conciseness.

(*d*) Papers to be eligible for competition shall have been produced by their authors without assistance and shall not have been previously contributed to

nor published by any other society or technical publication in whole or in part. Presentation before a meeting of, or publication by, this Society or by any of its Student Branches during the year of the competition shall not be construed as making a paper ineligible.

(*e*) The papers considered shall include papers submitted by Student Associates in competition during the year ending June 30.

(*f*) The Committee on Awards shall report its recommendations to the Council on or before October 1; the findings of the Committee shall be final. Awards shall be bestowed by the Council. The awards shall be announced at the Annual Meeting and shall also be published in the Record and Index.

Funds Available

The attention of our members is called to the following funds already established and available to carry out some of the awards granted by the Society.

(*a*) Henry Hess Funds, $1000 each. See Junior and Student Awards, page 274.

(*b*) A gift from Charles T. Main, Past-President of the Society, of $2500, the income to be awarded annually for the encouragement of research, good papers, or other activity for the advancement of engineering by any member of the Society. This may take the form of a medal or of a cash prize. Furthermore, it may be given in addition to any other award at the discretion of the Council.

(*c*) Max Toltz Fund of $15,000, the income to be used for assistance to students.

(*d*) John R. Freeman Fund of $25,000, the income to be used for travel scholarships and research.

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NECROLOGY

NECROLOGY

Eugene Hilarian Abadie

Eugene Hilarian Abadie, consulting engineer of Washington, D. C., was killed in automobile accident in that city on April 27, 1929.

Colonel Abadie was born at St. Louis, Mo., on March 1, 1872, the son of Eugene Solinac and Mary Louise (Snow) Abadie. He was educated in public and private schools and at Washington University, St. Louis.

From 1891 to 1901, he was connected with the Wagner Electric Manufacturing Company, St. Louis, first working in the shops and engineering department, and later serving as secretary, manager of sales, and member of the executive board of the concern. During the following two years he was associated also with the Bullock Electric Manufacturing Company, Cincinnati, Ohio, as manager of its sales organization. In 1901 he was one of the incorporators of the Wagner Bullock Electric Company of California, which during its first year he served in the capacity of vice-president.

In 1903 he became a member of the firm of E. H. Abadie & Co., engineers and contractors of St. Louis. Among the projects designed and built under his supervision during the next five years were the district heating plant and power house for the state buildings at Jefferson City, Mo.; the central heating plant for the Pana (Ill.) Gas & Electric Co.; all the underground conduits for public utilities in Louisville, Ky.; the New Orleans & Baton Rouge Elec. R. R. (in collaboration with Arsene Perrilliat); municipal power plant, Little Rock, Ark.; stripping plant for coal bed of the Lilly (Ky.) Jellico Coal Company.; electric power generating plant for the Consumers Light & Power Co., Ft. Worth, Tex.; U. S. Army sewer and water works at Jefferson Barracks, Mo.; and various other steam and electric power plants in St. Louis and other cities in central and southern states. The equipment for the heating, ventilating, and lighting systems and steam and electric power plants for department stores and other large buildings was furnished through his company.

From 1908 to 1917 Colonel Abadie was associated with Dr. George S. Hessenbruch, consulting engineer and treasurer of the industrial engineers corporation of St. Louis. He also served as consulting engineer to the Public Service Commission of St. Louis during a part of that period.

Abadie was commissioned a major in the Engineers Reserve Corps in 1917 and was promoted in 1918 to the rank of Lieutenant-Colonel in the Quartermaster Corps. He supervised the construction of cantonments, mechanical repair shops, hospitals, prison barracks, and camps and shops for the Motor Transport Corps. Upon his discharge from active service in 1919 he retained the rank of Lieutenant-Colonel in the Engineers Section of the Reserve Corps, and in the following year was commissioned Colonel in the Quartermasters Section, Construction Division, Officers Reserve Corps of the U. S. Army.

From August, 1919, to April, 1920, Colonel Abadie served as comptroller of the U. S. Shipping Board, Emergency Fleet Corporation. He then opened an office in Washington, D. C., as senior member of the firm of Abadie, Hessenbruch and Tanner, of St. Louis and Washington, specializing in industrial and administrative engineering. He acted as special agent for the International Maritime Corporation and Tropical Steamship Corporation, and assisted in a transportation survey of the District of Columbia for the Federation of Citizens Association.

Colonel Abadie became a member of the A.S.M.E. in 1921, was a life member of the American Institute of Electrical Engineers, and belonged also to the

American Society of Civil Engineers, Western Society of Engineers, American Society of Engineering Contractors, and a number of military organizations and clubs. He was a republican and an Episcopalian.

His widow, formerly Miss Alice Gloria Bolling, of Louisville, Ky., whom he married in 1903, a son, and two daughters, survive him.

Henry Adams

Henry Adams, consulting engineer, and president of the board of managers of the Maryland Institute, died suddenly at his home in Baltimore, Md., on December 9, 1929.

Mr. Adams was born on February 11, 1858, at Duisburg, Germany, the son of Henry and Margretta Adams. After a course in general engineering he took up special studies in building construction, heating and ventilating, and sanitation of buildings. He secured drawing room and shop experience with Guillamue & Wegneau in Duisburg, and was for a time assistant superintendent for them. Subsequently he was chief draftsman and superintendent of construction for Jos. Lohrey, Duisburg.

In 1880 Mr. Adams came to the United States, where his first position was with Bartlett, Hayward & Co., Baltimore, as assistant to the chief engineer. In 1886 he became chief engineer in the office of the supervising architect of the U. S. Government, in charge of all engineering work in connection with heating, ventilation, hoisting, and sanitation in public buildings. During his connection with the Government, which continued until 1898, he founded the mechanical department of the architect's office.

Mr. Adams opened his own office in Baltimore in 1898. As consulting engineer he designed, or supervised the installation of the mechanical equipment in many of the largest buildings in the city. He also directed the installation of mechanical equipment for the Union Medical College, Peiping, and designed that for the Masonic Temple in Manila.

His association with the Maryland Institute began in 1883 when he became instructor in mechanical drawing in the night school, a position which he filled for twelve years. In 1902 he became a member of the board of managers, later becoming vice-president, and in 1920 president of the board.

During the World War Mr. Adams was engineer of the Fuel Administration for Maryland and Delaware.

Mr. Adams became a member of the A.S.M.E. in 1899. He was a charter member and past-president of the American Society of Heating and Ventilating Engineers, a charter member of The Engineers Club of Baltimore, and a member of the American Water Works Association, Maryland Academy of Sciences, Municipal Art Society (Baltimore), and the Masonic fraternity, in which he was a Shriner. He had made a valuable collection of stamps.

Mr. Adams is survived by his widow, formerly Miss Mary Elizabeth Klingelhofer, whom he married in 1884, and by three sons, Ernest Henry, O. Eugene, and Clarence T. Adams.

Robert B. Adams

Robert B. Adams, whose death occurred on January 5, 1929, was born in Essen, Germany, in August, 1870. He came to the United State as a boy and served a four-year apprenticeship in the toolmaking trade in Ottuma, Iowa. He also took a correspondence school course in mechanical engineering. After completing his apprenticeship he worked as toolmaker and machinist in various manufacturing plants for the next ten year. He was then connected with the Link-Belt Machinery Co., Chicago, Ill., as toolroom foreman for six years, and with the Goodman Electric Company of that city in the same capacity for two years. For three years he was foreman and assistant factory expert for the S. F. Bowser Co., Ft. Wayne, Ind., and then spent two years as superintendent for the Wool Tilted Turret Machine Co., Brazil, Ind., and assistant superintendent of the Addressograph Company of Chicago.

Prior to the World War, Mr. Adams was connected for about five years with the New England Westinghouse Company, Meriden, Conn., as assistant superintendent, and for a short time with the King Sewing Machine Company, Buffalo, N. Y., in the same capacity. In 1918 he became assistant superin-

tendent of the Remington Arms Company, of Bridgeport, Conn., and was located at Rock Island, Ill. Subsequently he served as factory foreman for the A. J. Savage Munitions Co., San Diego, Calif.

Following the War, Mr. Adams spent five years in charge of the Williard & Wilson plant in Los Angeles, Calif., making oil tools. During this period he took out patents on a number of items in this field. In 1927 he was superintendent of the Grant Oil Tool Company, and at the time of his death was in charge of manufacturing at the Pacific Pump Works, both concerns of Los Angeles.

Mr. Adams became a member of the A.S.M.E. in 1916. He also belonged to the Masonic fraternity.

John Anderson

John Anderson was born at Aberdeen, Scotland, on November 28, 1872, the son of James and Mary (MacBean) Anderson. After attending the British Government School of Science and Technology at Liverpool, England, he served a five-year apprenticeship in engine building.

From 1890 to 1906, Mr. Anderson was marine engineer and at the end of this time was assistant to the chief engineer of a large American vessel. During the following six years he was engineer in charge of the steam heating division of the Union Electric Light & Power Co., St. Louis, Mo. He became connected with The Milwaukee Elec. Ry. & Light Co. as chief engineer in 1912 and at the time of his death on October 14, 1929, was vice-president in charge of power. He designed and constructed steam power plants in a number of places, conducted experimental work in pulverized coal burning under central station boilers, and helped to develop the radiant heat superheater.

Mr. Anderson became a member of the A.S.M.E. in 1920 and belonged also to the Engineers Society of Milwaukee and the American Association of Engineers, and was an honorary member of the National Association of Stationary Engineers. He was a Mason and belonged to several clubs. He had been Boy Scout Councillor for the district of Milwaukee and a Sea Scout commander. He also was commissioner of city safety in Milwaukee and a member of the Metropolitan Sewerage Commission of that city.

Surviving Mr. Anderson are his widow, formerly Rachel Thomson, whom he married in 1899, four daughters, and one son.

Albert Weist Atkinson

Albert Weist Atkinson, whose death occurred on March 5, 1929, at his home in Merchantville, N. J., was born at Mt. Holly, N. J., on March 22, 1861. His parents were Joseph Powell and Hannah Atkinson. He attended public school in Burlington County and then served an apprenticeship as machinist with the H. B. Smith Machine Co., Smithville, N. J., manufacturers of woodworking machinery.

From 1882 to 1891 he was connected successively with the Pennsylvania Railroad, as general machinist at Pavonia, N. Y.; the Electric Dynamic Company, Philadelphia; the Northrup Manufacturing Company, Camden, N. J., as general foreman; and Scull and Johnson, Camden, N. J., as shop superintendent. In 1891 Mr. Eldridge R. Johnson, of the last-named concern, opened a general machine shop in Camden, of which Mr. Atkinson was foreman for ten years. When the Victor Talking Machine Company was established at Camden in 1901 by Mr. Johnson and associates Mr. Atkinson became foreman of the machine shops, and later its superintendent of manufacturing. In 1907 he was elected to the Board of Directors and appointed assistant secretary of the company. In 1914 he became assistant treasurer but continued to have jurisdiction over the plant and it was under his direction that the buildings comprising the present plant were constructed.

In 1908 Mr. Johnson sent Mr. Atkinson to Europe to arrange for manufacturing affiliations, in order to insure foreign protection for Victor patents. Out of his trip grew German affiliations which continued up to the World War,

and British connections which are still in effect and have assumed first place among the foreign associated companies of Victor.

Another of Mr. Atkinson's outstanding achievements was the handling of production problems incident to the launching of the first cabinet instruments which carried the name "Victrola."

In March, 1928, Mr. Atkinson resigned as a director of the Victor Talking Machine Company, and retired to private life.

In addition to his connection with the Victor Company, Mr. Atkinson was sole owner of the J. R. Wilson Company of Philadelphia, dealers in victrolas, radios, etc.

During the World War, Mr. Atkinson served on the National Advisory Council. He was a member of the First Baptist Church of Merchantville and of the Engineers Club of Philadelphia, and a director of the Manufacturer's Club of Philadelphia. He joined the A.S.M.E. in 1914.

Mr. Atkinson was especially interested in yachting and was a commodore in the Island Heights Yacht Club and Manager of the Barnegat Bay Yacht Racing Association. He was also fond of horses.

He is survived by his widow, formerly Mary A. Goldy, whom he married in 1883, and by two married daughters.

Joseph E. Aue

Joseph E. Aue died at his home in New York, N. Y., on October 14, 1929, after a protracted illness. He was in his seventy-first year, having been born at Lamspringe, Germany, in 1859, the oldest son of Franz and Theresa (Hagemann) Aue.

After graduating from Josephinum High School, Hildesheim, Germany, Mr. Aue served three years as apprentice in the machinist's trade. He then had three semesters at the Technicum Rinteln A. D. Weser.

At the age of twenty he emigrated to the United States, where he secured employment as a grocery clerk and a driver for the Thirty-Fourth Street cross-town cars, in New York. He next became a machinist and draftsman for the Eisele Marble Works, DeLamater Iron Works, Eagle Pencil Works, and other concerns. As he mastered the English language he began a five-year engineering course at the Cooper Institute, and for many years after completing his studies, he was an instructor in mechanical drafting at this Institute and at the Vanderbilt Institute. In 1889 he became draftsman for the De La Vergne Machine Company, of New York, and was advanced to various other positions in the engineering department of this company, with which he remained until 1908.

From 1908 to 1913 he directed the erection and operation of large oil engines for the Snow Steam Pump Works of Buffalo. After returning to the De La Vergne Company for three years as chief engineer of their gas and oil engine department, Mr. Aue established an ice plant in New York known as the Williamsbridge Hygeia Ice Mfg. Co., Inc., which he maintained until a few years before his death, when he disposed of the plant and retired.

Mr. Aue was especially interested in combustion engines and had full charge of the design and installation at many large and important plants. He was the inventor of a number of accessory parts for ice plants and oil engines. He was always a studious man deeply interested in scientific research.

His principal hobby was sailing and yachting, and he spent much of his time in his boat, in the handling of which he was an expert.

Surviving Mr. Aue are his widow, Mrs. Marie Aue, and four children, Alwine, Frank, William, and Mathilde.

Mr. Aue became a member of the A.S.M.E. in 1899. He also belonged to the American Society of Refrigerating Engineers, Odd Fellows, Masons, and a number of clubs.

Axel Fred Backlin

Axel Fred Backlin, former construction engineer for the American Steel and Wire Company, well-known as an authority on rolling mills and wire mills, met with an untimely accident on May 1, 1929, when he was struck and instantly killed by an automobile. Mr. Backlin was returning to his home

in Philadelphia from a visit to the new rolling mills at Worcester, Mass., and had made a short stop at Oxford, Mass., where the accident occurred.

Mr. Backlin was born at Gäfle, Sweden, on July 18, 1863. At an early age he was employed at the large Domnarfvet Iron and Steel Works of the Stora Kopparbergs Bergslags Aktiebolag at Domnarfvet, Sweden, at that time the largest iron and steel works in Scandinavia and the largest in the world, based on charcoal as fuel. Here Mr. Backlin received a valuable training in the fundamentals of steel making, rolling of steel and wire rods, and in the drawing of wire.

In 1881 Mr. Backlin came to America and soon entered the Worcester plant of the Washburn & Moen Mfg. Co., then pioneers in the manufacture of wire and wire rods in this country. He obtained his schooling in academic and technical schools and by private tuition in both Sweden and Worcester, Mass. He became naturalized as an American citizen in 1884.

Mr. Backlin began as a draftsman for the Washburn & Moen Mfg. Co. on July 1, 1881, and continued in this position and as a testing engineer of engines and boilers until February, 1888, when he was made chief draftsman. In 1892 he was transferred to the Waukegan Works of the same company at Waukegan, Ill., as assistant superintendent. From the early part of 1893 to the latter part of 1894, he was employed as engineer of construction at the South Side Plant of the Jones & Laughlin Co. at Pittsburgh, Pa.

In 1894 he again returned to the Worcester plant of the Washburn & Moen Mfg. Co., as assistant to the chief engineer, which position he held until the year 1912. In 1901 the Washburn & Moen Mfg. Co. became the American Steel and Wire Company, a subsidiary of the U. S. Steel Corporation. During this early period Mr. Backlin had a large share in the construction of extensive additions at both the South and North Works at Worcester and in the building of new wire and rod mills of the company at Waukegan, Ill., Cuyahoga Works at Cleveland, Ohio, and Fairfield Works at Birmingham, Ala., for the manufacture of all kinds of wire and wire products, nails, etc.

In 1912 Mr. Backlin was transferred to the Pittsburgh office of the company as construction engineer, where he served until 1925. In 1916 the Company built, under his supervision, the large Zinc Plant at Donora, Pa., the Coke Works at Cleveland, Ohio, several new continuous rolling mills at Cuyahoga Works, Cleveland, Ohio, and a complete and up-to-date wire and rod mill at Duluth, Minn., the last-named being by far the best of its kind in the world at that time.

In March, 1925, he was transferred to the Cleveland office of the company where he remained until the early part of 1927 when, because of failing health, he was compelled to retire from active service. During his retirement, however, Mr. Backlin served as a consulting engineer for the company, which called him from one plant to another wherever new mills were being erected or contemplated or where problems had to be solved for which his advice was needed.

Mr. Backlin had been a member of the A.S.M.E. since 1902.

Stephen Balkwill

Stephen Balkwill, president of the Balkwill Manganese Crossing Co., Cleveland, Ohio, died at his home in Cleveland Heights, on October 9, 1929, from pneumonia. Mr. Balkwill had attained national prominence in the field of railroad engineering and was an authority on the construction of switches and crossings.

Mr. Balkwill was a native of Cleveland where he was born on April 1, 1871, the son of Washington Ward and Catherine (Braymaier) Balkwill. He attended the Cleveland High School and Case School of Applied Science and served an apprenticeship with Bowler & Co. in patternmaking and foundry practice. For two years he was proprietor of a pattern shop. Subsequently he was connected for twenty-two years with the Cleveland Frog & Crossing Co., in charge of the pattern and manufacturing departments, and designing and building new machinery and electrical and steam equipment.

Mr. Balkwill organized the Balkwill Company in 1917. He was also part owner of the Cleveland Steel Casting Company. He was the inventor of an articulated cast manganese railroad crossing, adopted as a standard by many

large railroads, both in the United States and abroad. He contributed articles on track work to technical magazines.

Mr. Balkwill became a member of the A.S.M.E. in 1903. He had served as a member of the Track Committee of the American Railway Engineering Association. He also belonged to the Cleveland Engineering Society and a number of clubs. He was a 32d degree Mason and a member of the Presbyterian Church. He was a leader for many years in the business and social life of his community. He is survived by his widow, Anna (Bomberger) Balkwill, whom he married in 1896, and by one son, Stephen Ward Balkwill.

George Hale Barrus

George Hale Barrus, consulting engineer, Boston, Mass., was born in Goshen, Hampshire County, Mass., on July 11, 1854, the son of Hiram and Augusta (Stone) Barrus. He died in Brookline, Mass., on April 3, 1929, after a short illness.

As a boy he took a special interest in the use of woodworking and other tools, preferring to spend his leisure time at work with these, rather than at play with other boys. He was educated in the public schools of Reading, Mass., and was graduated at the Massachusetts Institute of Technology in the Department of Mechanical Engineering in 1874. After graduation he remained at the Institute, assisting Geo. B. Dixwell in the design and construction of a steam engineering laboratory, the first of its kind in any polytechnic school in the United States. After its completion he aided Mr. Dixwell at the laboratory in a series of experiments on superheated steam conducted there for the United States Navy.

Mr. Barrus opened his Boston office in 1880, and as an expert consultant in steam engineering his professional services were employed by many of the leading manufacturers and users of steam and power in all parts of the United States and Canada. He was engaged by several paper mills to make periodical inspections and reports for the purpose of obtaining better economies in their plants. During recent years he had devoted considerable time to the development of his drainage system as applied to driers of paper machines. This system has also been applied to slashers in a cotton mill. He was frequently called upon as an expert witness in important cases in litigation.

He served repeatedly as judge of power exhibits at the Massachusetts Charitable Mechanic Association Fairs; as judge at the Franklin Institute Electrical Exhibition in Philadelphia; and as the Massachusetts member of the Board of Judges on power exhibits at the Columbian Exhibition at Chicago in 1893. His inventions include a variety of forms of the steam calorimeter, a coal calorimeter, a draft gage, a steam boiler, and steam and water meters.

Mr. Barrus joined the A.S.M.E. in 1883 and was made vice-president in 1905 to fill the unexpired term of Frederick W. Taylor, who had been elected president. He was a member of several committees for devising standard methods for testing boilers, engines, pumps, and locomotives, and had served as chairman of the Committee on Standard Tests of Pumping Engines, and of the committee which prepared the revised Power Test Codes issued in 1915.

He was also a member of the Society of Naval Architects and Marine Engineers, the Boston Society of Civil Engineers, and the New England Water Works Association.

He was invited by President Roosevelt to serve on a National Advisory Board on Tests of Fuels and Structural Materials.

While a resident of Reading in 1886, he was active in effecting a union between the two Congregational churches of that town, long separated. While a resident of Dorchester, he was a member of the vestry of St. Ann's Protestant Episcopal Church, and also served as treasurer of the corporation.

In national politics Mr. Barrus was always an ardent Republican.

His professional books include: "Tabor Steam Engine Indicator," 1886; "Boiler Tests," 1891; "Engine Tests," 1900; and "The Star Improved Indicator," 1903. He also contributed articles on engineering subjects to the technical press and to the societies of which he was a member. Recently an article by him on mechanical engineering appeared in a collection of essays entitled "The Profession of Engineering."

On June 20, 1877, he married Sarah Dewey, of Reading, Mass., who died a number of years ago. The death of their daughter followed that of Mr. Barrus by about two weeks.

On October 2, 1897, he married Louisa C. Williams, of Syracuse, N. Y., who survives him.

Charles Arthur Bennett

Charles Arthur Bennett, for many years connected with the Fellows Gear Shaper Company, of Springfield, Vt., and Detroit, Mich., died on January 4, 1929, following an operation for appendicitis.

Mr. Bennett was born at Norwich, N. Y., on October 16, 1881, the son of Charles and Anna Bennett. He attended Homer Academy, Homer, N. Y., after which he served an apprenticeship in the machine shop of the Conger Manufacturing Company of Groton, N. Y. During the five years from 1904 to 1909 he worked as machinist for the International Harvester Company, and McIntosh & Seymour, Auburn, N. Y., and the Gleason Works, Rochester, N. Y.

After taking a normal training course, including machine design, mechanical drawing, foundry, practice, and patternmaking, at the Mechanics Institute in Rochester, Mr. Bennett secured a position with the Fellows Gear Shaper Company. He spent several months at the factory in order to familiarize himself with the products of the concern, and then went on the road as demonstrator and salesman. In 1913 he was sent to Europe as foreign representative of the company, and for ten years advised customers there on matters of design of gear mechanisms, equipment required, and methods of production, and had charge of the service men furnished by agents, as well as his own. Returning to the United States in 1922, Mr. Bennett became general service engineer at the Detroit office. With the exception of two years which he spent as salesman in the New York and Pennsylvania territory, he was located at Detroit until his retirement in April, 1928, on account of ill health. The remainder of his life was spent at his farm at Honeoye Falls, N. Y.

Mr. Bennett became a member of the A.S.M.E. in 1927. He was also an honorary member of the London Society of Foreman Engineers, and belonged to the Society of Automotive Engineers and the Masonic fraternity. He is survived by his widow, Mrs. Martha R. (Gore) Bennett, and by one daughter, Margaret.

Oscar S. Berg

Oscar S. Berg, chief engineer and superintendent of electrical maintenance of the State Mill & Elevator Co., Grand Forks, N. D., died on February 19, 1929. He was born on May 23, 1893, at Tigerton, Wis., the son of Sophus and Jennie S. Berg. The family moved to Grand Forks when he was two years of age, and it was there that he received his early education and attended business college. Later he entered Sibley College of Cornell University to study mechanical engineering.

Mr. Berg's first position was with the Kerr Turbine Company, Wellsville, N. Y., as erecting engineer. During the World War he was engaged in installing turbines on battleships. In 1922 he returned to Grand Forks and accepted a position with the State Mill and Elevator Co. as assistant to the chief engineer. His promotion to chief engineer came in April, 1925.

Several articles on the burning of lignite were contributed by Mr. Berg to the technical press and he discussed sanitation and the contamination of city water in the local papers. He was an active member of the Presbyterian Church and the International Union of Steam and Operating Engineers. He became an associate member of the A.S.M.E. in 1927.

He is survived by his widow, Clara Olson Berg, whom he married in 1923, and by two sons.

John Dudley Bird

John Dudley Bird, engineer and banker, died at St. Mary's hospital, Milwaukee, Wisconsin, on December 8, 1929, after a brief illness. He is survived by his widow, Mrs. Laura Madeline Bird, and by two sons and two daughters.

Mr. Bird was vice-president of the First Wisconsin National Bank and president of both the Cudahy and Oakland Avenue State Banks. He had been a resident of Wisconsin for almost thirty years, confining his business activity to the Milwaukee district since 1909.

He was born in Newark, N. J., on February 12, 1868, of old English stock. After an education in the public grammar and high schools of Newark, Mr. Bird was apprenticed to the Hewes and Phillips Iron Works of that city.

During his apprenticeship, which he completed in 1888, he was privileged to leave the plant before regular closing time to attend the Newark Technical School night classes. He also received special engineering instruction from William Kent, author of Kent's Mechanical Engineers' Handbook.

In 1890 Mr. Bird formed a partnership and founded Conover and Company, doing a consulting engineering business in New York, N. Y. During this time the young engineer designed the Conover condenser, which for a number of years was very favorably thought of.

Owing to business reverses, he sold his interest in the Conover Company in 1891, and in the following years was employed by the George H. Corliss Steam Engine Company of Providence, R. I., the Frick Company of Waynesboro, Pa., and the Ball and Wood Company of Elizabeth, N. J., manufacturers of high-speed engines.

While with the last-named firm he designed and built the first high-speed Corliss engine.

Mr. Bird remained with the Ball and Wood Company until 1901, and during his employment there became very much interested in internal-combustion engines. Therefore, in 1901, he became general superintendent of the gas-engine department of the Fairbanks & Morse Company, Beloit, Wis. He remained there until 1907, and assisted materially in building more internal-combustion engines than probably all other concerns in the country manufactured during that interval.

In 1907 Mr. Bird became associated with the International Steam Pump Company, going to the Power Mining Machine Works, later the Worthington Pump & Machinery Corporation, Cudahy, Wis., as assistant to the works manager. In 1909 he was sent to Europe with Nathan Fleischer, then treasurer of his firm, on a tour of inspection of the manufacturing and sales departments of the European connections of the pump company.

Upon his return to the United States, Mr. Bird submitted a report covering his trip abroad, making suggestions, many of which were adopted by the corporation. Soon afterwards he was promoted to works manager and maintained that position until his resignation about six years before his death.

After a year's vacation, Mr. Bird became connected with the American Exchange Bank, now a part of the First Wisconsin interests. When the bank consolidated he was offered, and accepted, a position as vice-president.

Mr. Bird was an active member in club life in Milwaukee. He was a thirty-second degree Mason, past-president of the Blue Mound Country Club, a member of the Tripoli Country Club, and a figure in the Association of Commerce. He first joined the A.S.M.E. in 1891 and became a full member in 1905.

During the World War, Mr. Bird was a "dollar-a-year man," being president of the Wisconsin Gun Works, manufacturers of French 75-mm. guns.

Robert Wilson Bissell

Robert Wilson Bissell metallurgical engineer and geologist, died at his residence in Los Angeles, Calif., on January 18, 1929.

Mr. Bissell was the son of William Semple and Eliza Shields (Wilson) Bissell. He was born on July 3, 1866, in Pittsburgh, Pa., where he secured his early education. Subsequently he attended the Realgymnasium at Wiesbaden, Germany, and in 1886 was graduated as a civil engineer from the Pennsylvania Military Academy.

After spending some time in the employ of the Pennsylvania Railroad, in the engineering department, Mr. Bissell continued his studies at the Massachusetts Institute of Technology, where he remained for three years. He then returned to his native city, where he was employed by the Duquesne Forge Company,

rising from the position of shipping clerk to that of general superintendent. During the Spanish War he was in service in Porto Rico.

From 1903 to 1911 Mr. Bissell was engaged in the operation of mines and smelters in Mexico, serving in managerial positions with several concerns. After returning to the United State he studied metallurgy and economic geology, first at the University of Washington, Seattle, and later at Columbia University, and received degrees in mining and metallurgy from both these institutions.

In 1915 Mr. Bissell became New York efficiency engineer, handling valuations, examinations, and reports for Gunn, Richards & Co., and W. B. Richards & Co. for the next five years. During this time he took charge of plant design, construction, and operation for the Pittsburgh Salt and Chemical Co., and in 1920 he engaged in similar work for the Vegetable Oil Products Company, of Pittsburgh, in connection with plants at San Pedro, Calif., and other points in the West. He continued in mining and metallurgical engineering with headquarters in Pittsburgh, for a time was general manager for the Pittsburgh Steel and Chemical Co., and served as secretary and treasurer of the Gas Industries Company of that city in 1926 and 1927. He then removed to Los Angeles, his home at the time of his death.

Mr. Bissell continued his studies in economic geology and petrographic microscopy and was unusually well informed in these fields, as well as being an excellent mathematician. He was an ardent sportsman and expert rifleman, and had secured many fine specimens, including the grizzly bear, mountain sheep, and silver tip of the Rocky Mountains.

Mr. Bissell became a member of the A.S.M.E. in 1920. He also belonged to the American Institute of Mining and Metallurgical Engineers and the American Electrochemical Society.

Mrs. Bissell, formerly Miss Gertrude Mueller, whom he married in 1904, survives her husband.

Carl Victor Bjornvall

Carl Victor Bjornvall, mechanical engineer, Port of Portland, Oregon, died in that city on November 4, 1929.

Mr. Bjornvall was born at Stromstad, Sweden, on May 21, 1876, the son of Martin B. and Caroline Bjornvall. His early education was through private instruction, and his technical training was secured at the college at Horten, Norway, from which he received a mechanical engineering degree in 1898. After some shipyard and drafting-room experience in Norway, Mr. Bjornvall came to the United States in 1900.

Prior to his position with the Port of Portland he was successively connected with the Columbia Engineering Works, of Portland, as mechanical draftsman; with J. C. B. Lockwood, consulting engineer, Portland and Seattle, Wash., as mechanical draftsman and assistant engineer; and with The Foundation Company, Portland, as superintendent of shipyard.

At the time of his death Mr. Bjornvall had a patent pending on telescoping steel hangar doors. He was a member of the Masonic fraternity, the Oregon Technical Council, the A.S.C.E., and the A.S.M.E., which he joined in 1925. He is survived by his widow, Martha H. (Allen) Bjornvall, whom he married in 1919.

John Balch Blood

John Balch Blood, economist for the Research Bureau for Public Utility Securities, New York, N. Y., died on February 28, 1929, at the Post Graduate Hospital in New York of heart trouble.

Mr. Blood was born at Newburyport, Mass., on July 21, 1870, the son of George Whitefield and Mary Nelson (Balch) Blood. He attended the Massachusetts Institute of Technology, from which he received a B. S. degree in electrical engineering in 1890. During the next six years he was assistant engineer in the railway department of the Thomson-Houston Electric Company and the General Electric Company at Schenectady. In 1894 he was appointed

designing engineer of railway motors and designed the motor used for the Intramural Railway at the World's Fair.

In 1896 and the following year Mr. Blood was engineer for the Union Elektricitats Gesellchaft, Berlin. He then became a member of the firm of Blood & Hale, consulting engineers of Boston, Mass., with which he remained until 1911. After three years as inspecting engineer for the Stone & Webster Engineering Corporation of that city he engaged in the construction of the Passaic Cotton Mills at New Bedford, Mass., and did consulting work.

During the World War. Mr. Blood served as Lieutenant-Commander in the U. S. Naval Reserve Force, commanding the U.S.S. *Kwasind.* Prior to the War he had served for twelve years in the Naval Militia and had been Captain and chief of the Naval Bureau of the Naval Militia in Massachusetts.

After being released from service he was appointed valuation examiner for the Interstate Commerce Commission, Washington, D. C. In 1927 he accepted the position which he held at the time of his death.

Mr. Blood was a Republican and for four years had served as councilman and alderman in Newburyport. In addition to membership in the A.S.M.E. he was a Fellow of the American Institute of Electrical Engineers, Royal Economic Society, and Royal Statistical Society, and a member of the U. S. Naval Institute, American Economic Association, American Statistical Association, and a number of military organizations and clubs. He was a Congregationalist. His recreations were reading and tennis. He held several patents in multiple railway control.

Alexander T. Brown

Alexander T. Brown, president of the Brown-Lipe Gear Company of Syracuse, N. Y., and inventor of the Smith-Premier typewriter and L. C. Smith shotgun, died at his home in Syracuse on January 31, 1929. He had been in failing health for some time.

Mr. Brown had long been prominent in the building up of Syracuse industries and was identified with a number of the city's foremost enterprises including, besides the gear company, the H. H. Franklin Manufacturing Company and the Smith-Premier Typewriter Company, of both of which he was at one time president, and the Globe Forge & Foundries, Inc. Business of the Brown-Lipe Gear company became so important that a seceond organization, the Brown-Lipe-Chapin company, was formed, later becoming a General Motors subsidiary.

Mr. Brown was born at Scott, in Cortland County, New York, on November 21, 1854. His father, Stephen S. Brown, was a native of the same section, and his mother was Nancy N. Alexander of Leyden, Mass. His early education was gained in the district schools near his home and he later attended Homer Academy. His first business experiences was an agent for a harvester machine company, during which employment he also sold hardware.

He went to Syracuse in 1879, and became connected with the mechanical department of the old W. H. Baker firearms business. In this position his inventive genius first began to show itself and after some experimenting, he produced the famous L. C. Smith shotgun. Mr. Brown remained with the Baker firm in the manufacture of this firearm until the business was sold to the Hunter Arms Company.

Invention of the Smith-Premier typewriter followed soon after and for a time Mr. Brown devoted himself to its manufacture. The business and right to the machine later were acquired by the typewriter concern which now manfactures the Remington machines.

Mr. Brown also invented a number of devices for the telephone and automobile. His last invention which won attention was put forth in 1921, when he perfected a motor binder and reaper, designed for farm use in fields of 100 to 150 acres. Several years' effort preceded successful tests of the machine.

Amazing efficiency in the use of his time characterized Mr. Brown. He was at one time an executive or director in fifteen concerns, giving time and interest not only to the business routine, but also to the manufacturing end. He also had been a director of the First Trust and Deposit Company and a trustee of Syracuse University and the New York State College of Forestry. He was a member of the Grade Crossing Commission of Syracuse from the time

of its creation in 1911 until his resignation in 1925, and had served as chairman since 1912. He took part in various Chamber of Commerce projects, and was a member of the board of the Hospital of the Good Shepherd. He was a life member of the A.S.M.E., which he joined in 1890, and belonged also to the American Gear Manufacturers' Association, American Red Cross, National Geographic Society, New England Historic Genealogical Society, Roosevelt Memorial Association, Society of Automotive Engineers, Sons of the American Revolution and to a number of clubs, including the Automobile, Citizens, Century, Technology, and Yacht Clubs of Syracuse, the Onondaga Country Club, the Syracuse Anglers' Association, the Adirondack League, and the New York Transportation Club. He was an active member of the Masonic fraternity, and in politics a Republican.

Mr. Brown married Miss Mary L. Seamens, a daughter of Julian C. Seamens of Virgil, in 1883, and they had two sons, Charles S. Brown and Julian S. Brown. He is survived by his family.

Harold G. Bruner

Harold G. Bruner was born at Duncansville, Pa., on May 10, 1884, the son of William S. and Clarinda G. Bruner. After working for a time in Boston and attending night school he entered the Massachusetts Institute of Technology, from which he received a B. S. degree in chemical engineering in 1913.

Mr. Bruner was employed continuously from the time of his graduation until his death on July 29, 1929, by the Boston Woven Hose & Rubber Company. For the first three years he was in charge of the chemical, experimental, and testing laboratories, and worked on the design and developments of improvements to mechanical rubber goods, molds, etc. He then took charge for a year of the Plymouth Plant of the company. In 1917 he was appointed assistant technical superintendent of the company and for several years had entire charge of experimental development work on all of its products, purchase and erection of all new equipment, and design of all special labor-saving machinery built for special operations. He was promoted to that position of mechanical development supervisor in 1920 and in 1923 to that of plant engineer.

Mr. Bruner was a member of the Masonic fraternity, vice-president of the Plant Engineers' Club of Boston, a member of the Men's Club of Greenwood, where he had made his home for eight years, a charter member of the Green-Greenwood Quoit Association, and a member of the A.S.M.E. since 1925. In 1914 he married Miss Alice Taylor and is survived by her and three children.

Charles Francis Brush

Charles Francis Brush, inventor of the arc light and an outstanding figure as a scientist, humanitarian, and philanthropist, died at his home in Cleveland, Ohio, on June 15, 1929, of pneumonia. Although eighty years of age he had been active in business and able to go to his office daily until within a few weeks of his death.

Mr. Brush was born at Euclid, Ohio, on March 17, 1849, the son of Colonel Isaac Elbert and Mrs. Delia Williams Phillips Brush. He attended the Cleveland High School and then entered the University of Michigan, from which he received a B.S. in mining engineering in 1869. In recognition of his achievements the University conferred the degrees of M.S. and Sc. D. upon him in 1899 and 1912, respectively. The Western Reserve University, of which he was a trustee, gave him a Ph.D. in 1880 and LL.D. in 1900, and the degree of LL.D. was also conferred upon him in 1903 by Kenyon College. In 1928 he received the degree of Doctor of Engineering from the Case School of Applied Science.

From his early childhood Dr. Brush was interested in scientific reading and experiments. He studied astronomy, chemistry, and physics, and made many small instruments such as telescopes, microscopes, and photographic appliances. In his high-school days he constructed a very small arc light operated by means of a number of batteries, and the idea of arc lighting persisted with him. Following his graduation from the University of Michigan he settled

in Cleveland as consulting chemist. Three years later he became an iron and ore commission merchant. But during these years he had been studying the problem of developing a simple, inexpensive dynamo suitable for lighting, and in 1876 an open-coiled dynamo with a nine-inch armature, built from his drawings, was successfully tested, the motive power being a team of horses attached to a horsepower machine used for sawing wood. This was the initial step in commercial arc lighting, and Dr. Brush now dropped all other interests to devote himself entirely to the development of the arc light.

In 1877 he introduced the compound field winding for constant potentials, first used in connection with plating machines, and now generally applied to electric lighting. In the same year two dynamos built for lighting were exhibited and tested at the Franklin Institute in Philadelphia. Dr. Brush then turned his attention to lamps suitable for arc lighting, and designed what was known as the "ring clutch" lamp, which cost only about one-quarter as much as lamps previously used in laboratory experiments, and was less liable to get out of order. The earliest form of the Brush arc-light machine was exhibited at the Charitable Mechanics' Fair in Boston in 1878, and in that same year the first industrial use of the electric lamps was made in a clothing store in Boston, where a six-light plant was installed; from that time on their use spread with great rapidity. The first instance of public street lighting was in the public square in Cleveland in 1879. Soon after that public lighting stations were established in New York, Boston, Philadelphia, Baltimore, and many other large cities in the United State, and 1881 the arc light was introduced in England and on the Continent, where it found immediate favor. Dr. Brush also devised the differential arc lamp, the construction and operation of which included the principle making it possible to operate lamps in series instead of in parallel. The automatic cut-out, permitting each lamp to cut itself out of circuit should trouble arise or the carbon burn out, was a further contribution to arc lighting invented by him.

In 1880 Dr. Brush founded the Brush Electric Company for the purpose of producing his inventions. This company was absorbed by the General Electric Company ten years later, and the works removed from Cleveland to Schenectady.

Dynamos and lamps for arc lighting were not the only electrical inventions of Dr. Brush. After the greater part of his work upon these matters was completed he made a study of the storage battery, which, until then, had been but slightly used because of the difficulty of manufacture and the expense of maintenance. He devised a new method of making lead plates and of pasting them with electrolytic materials, and also the ingenious system of charging storage batteries from an arc-light system and the subsequent subdivision of light, demonstrating that it was possible to run incandescent lights on an arc circuit. As the result of these inventions the storage battery was made a scientific and commercial success. He also introduced the copper plating of carbon electrodes.

For these and other devices essential to modern electrical engineering Dr. Brush received many honors, in addition to the degrees conferred upon him. In 1881 he was made a Chevalier of the Legion of Honor by the French Government. In 1899 the American Academy of Arts and Sciences, of which he was a Fellow, awarded him the Rumford Medal. In 1913 the American Institute of Electrical Engineers, of which he was a member, bestowed the Edison Medal upon him, and in 1928 he received the Franklin Medal from The Franklin Institute, to which he belonged.

In addition to heading his own company Dr. Brush was president of the Cleveland Arcade Company, which post he took in 1887; founder and first president of the Linde Air Products Company; an incorporator of the Case School of Applied Science; and trustee of Adelbert College, the Cleveland School of Art, and the Lake View Cemetery, Cleveland.

In 1891 Dr. Brush retired from active life as a manufacturer and devoted himself to pure science. He fitted up a splendid laboratory in his home and made a thorough study of the problem of rare gases in the atmosphere and the theory of gravitation. Among the many papers published by him are several on the latter subject. He was essentially a scientist, and scorned to accept anything in the scientific world which could not be definitely proved.

He was noted also as a humanitarian. One of the last acts of his life was the establishment of the Charles F. Brush Foundation for the Betterment of the Human Race. He donated $500,000 to be placed in trust in memory of his son, Charles F. Brush, Jr.

Just before his death Dr. Brush had accepted the national chairmanship of a campaign for an endowment and building fund for the American Philosophical Society, of which he was a member. He also belonged to many other organizations, including the Cleveland, Ohio, and United States Chambers of Commerce, of the first of which he was president in 1909 and 1910; American Institute of Mining and Metallurgical Engineers; National Electric Light Association; Illuminating Engineering Society; American Chemical Society; Royal Society of Arts; American Historical Association; and Archaeological Institute of America. He was a life member of the A.S.M.E., which he joined in 1880, and of the British Asssociation; an honorary member of the American Society for Steel Treating and the Cleveland Engineering Society; and a Fellow of the American Association for the Advancement of Science, American Physical Society, American Geographical and Statistical Society, and North British Academy of Arts.

His clubs were the Union, of which he served as president in 1897 and 1898, University, Country and Mayfield, of Cleveland; the Winous Point Shooting Club, of which he was president from 1895 to 1922; the University of New York, and the Royal Societies of London. He was a warden of Trinity Cathedral of Cleveland.

Dr. Brush married Mary E. Morris of Cleveland in 1875. Two of their three children survive him. They are Mrs. Edna Perkins and Miss Helene Brush.

Alexander Bismarck Carstens

Alexander Bismarck Carstens was born on December 25, 1872, at Central City, Colorado, the eldest child of Alexander and Emma (Pischel) Carstens. He attended the common schools at Central City but left school at the age of eleven to aid his widowed mother; so far as is known his only other opportunity to attend a formal school was for six months at Aspen, Colorado, whither the family moved shortly after his father's death.

Orphaned at the age of seventeen by the death of his mother, he was left with the care of five brothers and sisters, and with his characteristic energy, he not only kept this family in close touch but acted as their advisor and materially assisted in their support. During these years he worked as a machinist in the shops of Samuel Selden in Aspen during the boom days of that famous camp, and by necessity and through his special aptitude for mechanical construction early became known for his thorough and skilful work. After a short period on the repair crew of the concentrator of the Smuggler Mining Company, he was appointed master mechanic at the Smuggler Mine at the age of twenty-two and continued in this work for three years, when he resigned and went to the Cripple Creek district where he shortly accepted a similar position with the Portland Mining & Milling Co. at Victor, Colorado. After two years in Victor he was made master mechanic with the Ibex Mining Company at Leadville, where he began to apply his ideas and inventions to the design of mine-pumping equipment, pioneering many new orthodox features of electric mine-pumping practice and design. Mine pumping formed one of his principal interests throughout his entire life.

In 1903 he was appointed superintendent of machinery for the Compañia Minera de Peñoles, S. A., at Mapimí, Durango, Mexico, and continued with this company and their associates until his untimely death. As the Peñoles Company's interests expanded, his responsibilities increased, and in 1921 he was made chief mechanical engineer as well as consulting engineer for the American Metal Co., Ltd., of New York, giving a great deal of his time to the design and construction of important installations of steam-power plants, mine-pumping equipment and tramways at this company's properties in Cuba and Mexico.

His death occurred on October 24, 1929, and was due to a broken back suffered in an accident in the Ojuela mine in Durango, Mexico, on February 20, 1929.

Mr. Carstens became a member of the A.S.M.E. in 1906, and also belonged to the Monterrey (Mexico) Foreign Club, the Monterrey Country Club, and the Masonic fraternity. He was married in 1899 to Miss Blanche Seymour of Aspen, Colorado, who died in 1901. In 1916 he married Miss Alvah Dodson of Corpus Christi, Texas, who survives him.

Samuel S. Caskey

Samuel S. Caskey, mechanical and consulting engineer for E. I. du Pont de Nemours & Co., Wilmington, Del., was born at Catasauqua, Pa., on December 10, 1864. He was the son of Clark and Mary (Wilson) Caskey.

After completing his grammar school education at Mauch Chunk, Pa., in 1879, Mr. Caskey entered the employ of Coxe Bros. & Co., Drifton, Pa., as pump and engine boy. Two years later he was transferred to office work where he had an opportunity to study telegraphy. He continued his studies in mathematics and took up drawing under private instruction at night. In 1882 he was transferred again to the machine shops and had opportunity to learn machine, foundry, car and mill work. During this time he attended evening classes at the Coxe Mining and Mechanical School, where he secured a knowledge of drafting, surveying, and the mechanics of engineering. This training fitted him for the position of draftsman for the company, to which he was assigned in 1883. The following year he attended Newark Academy, at Newark, Del., where he pursued academic studies. In 1885 he returned to his work as draftsman in Drifton.

In 1886 Mr. Caskey became associated with the Baldwin Locomotive Works, Philadelphia, as locomotive draftsman. Two years later he was sent to St. Louis, Mo., as mechanical engineer on the extension of water works for that city, but on account of poor health resigned the position in 1889 and returned to Philadelphia, where he worked for a time as draftsman on high-duty pumping and blowing engines with the I. P. Morris Co.

The Link Belt Engineering Company next engaged the services of Mr. Caskey, first as foreman of the machine shop and later as superintendent of shops. In 1891 he was sent to Jerome, Ariz,, to construct a five-mile overhead tramway, upon the completion of which he returned to Philadelphia and continued his work as superintendent for the company until 1898.

From that time until 1904, Mr. Caskey was connected with the Harlan & Hollingsworth Co., shipbuilders, of Wilmington, Del. His work dealt with equipment and tools for construction work, building and installation of engines, boilers, and machinery in ocean-going ships, and speed trial trips at sea of several torpedo boat destroyers. He resigned his position to take up the manufacture of hydropneumatic machinery of his design. He built presses, punches, shears, and riveters of varied design and power for many large concerns. In 1910 he helped to organize the Caskey Valve Company for designing and building hydraulic valves, and was vice-president and engineer for the company.

Mr. Caskey entered the employ of the Engineering Department of the E. I. du Pont de Nemours & Company, on April 1, 1912, as specialist engineer in the design of hydraulic machinery, transmission, and general mechanical design, in which he was regarded as an expert, ranking with the best engineers in the country in this line of work.

During the World War period when the Company, like a great many other concerns, was called upon to increase the production of its existing plants, as well as to construct new ones, Mr. Caskey's keen inventive ability in developing hydraulic, hydropneumatic, and other specialized equipment was invaluable. He played a very important part in the Company's accomplishments by the design and development of special equipment for munition manufacture, as well as of a miscellaneous nature.

He served as a member of the Company's Machinery Commission and was considered an authority on the subject of fatigue of metals.

After the close of the War he acted as specialist engineer until December 31, 1928, when he was retired on account of ill health. His death occurred on April 22, 1929.

Mr. Caskey became a member of the A.S.M.E. in 1921. He also belonged to the Army Ordnance Association and was a 32nd degree Mason. He is survived by his widow, Grace Free Caskey, whom he married in 1893.

John Cerny

John Cerny, designer for the H. R. L. Motor Co., Seattle, Wash., at the time of his death on March 10, 1929, was a native of Austria. He was born in Vienna on April 25, 1875, the son of Johann and Rosalia Czerny, and was educated at the Realgymnasium in Vienna and the University of London.

Mr. Cerny began his professional career with Vickers, Ltd., in Erith, Kent, England, in charge of jigs, tools, and gages in the shops. He was located there from 1900 to 1907. The next four years he spent with Fraser & Chalmers, also of Erith, designing Rateau steam turbines at first, and later large gas engines. From 1911 to 1916 he was in charge of the gas engine department and engaged in the design of large gas engines for Lilleshall Company, Oakengates, Shropshire, England. He came to the United States in May, 1916, and accepted a position with Rockwood & Co., Brooklyn, manufacturers of cocoas and chocolate. He remained in Brooklyn two years before removing to Seattle.

Mr. Cerny worked with a number of concerns in Seattle, including the Johnson Manufacturing Company, formerly Seattle Machine Works, for which he was chief engineer, and the Pacific Coast Coal Company, which he served as draftsman and designer.

He belonged to the Verein deutscher Ingenieure, and joined the A.S.M.E. in 1927. He was also a member of the Masonic fraternity. He enjoyed outdoor activities, particularly gardening and fishing.

Mr. Cerny is survived by his widow, Dora (Ivins) Cerny, whom he married at Erith in 1901. He had his name, formerly spelled "Czerny," simplified only a short time before his death.

Ezra E. Clark

Ezra E. Clark, fire insurance engineer for the Factory Mutual Fire Insurance Company, Boston, Mass., died at the Newton Hospital on November 11, 1929.

Mr. Clark was born at Palmer, Mass., on January 27, 1858. His parents were the Reverend Jonas Morton Clark and Hetty Elizabeth Clark. After his public school training he attended Wilbraham Academy and then Worcester Polytechnic Institute, from which he was graduated in 1880 with the degree of Bachelor of Science.

After a year with J. R. Robinson, of Boston, in boiler material inspection work, Mr. Clark became associated with the Duane Steam Pump Company, Holyoke, Mass., with which he remained for over fifteen years, engaged in layout work, drafting, designing, erecting machinery, testing, and selling. He then spent two years in shop and drafting-room work with Edw. P. Allis, of Milwaukee, Wis., and an equal period in the erecting department of Henry R. Worthington, in Brooklyn. Since then he had been with the Factory Mutual Fire Insurance Company, his work for whom included inspections, compiling specifications for fire pumps, etc.

Mr. Clark was married in 1887 to Eva Florence Lemen and in 1894 to Frances M. Fuller. He is survived by his widow and by two sons.

Mr. Clark's membership in the A.S.M.E. dates from 1916.

Robert G. Clyne

Robert G. Clyne, president of the R. G. Clyne Engineering Company, St. Louis, Mo., whose death occurred on May 10, 1929, was born at Harlem, Ontario, Canada, in 1865. After serving an apprenticeship with the Frost & Wood Machine Co., Smith's Falls, Ontario, he went to Lakeport, N. H., where he worked for three years with the Crane Knitting Machine Company. From 1893 to 1899 he was with the S. C. Forsaith Machine Co., in charge of the experimental department, developing and building mailing machines. He then spent seven years with L. F. Fales, at Walpole, Mass., developing automatic machinery, and three years in charge of the experimental department of the Union Metallic Cartridge Company, of Bridgeport, Conn.

Mr. Clyne left the East in 1910, when he became manager for The Western Cartridge Company, of Alton, Ill. Terminating his connection with this company about eight years later, he took up mechanical engineering practice in St. Louis, served for a time as president of the Central Machine Works of that city, and about 1924 established his own company there.

Mr. Clyne became a member of the A.S.M.E. in 1913.

Francis B. Cockburn

Francis B. Cockburn, chief engineer, The Lodge & Shipley Machine Tool Co., Cincinnati, Ohio, whose death occurred on June 21, 1929, was born at Basingstoke, England, on September 26, 1863. His parents were John Peter and Swissabel (Blakeway) Cockburn. Mr. Cockburn took the degree of M.E. from King's College and received his practical training with Hawks-Crawshay & Sons, Gateshead-on-Tyne, England. He then was connected two years each with John Betram & Sons and Wm. Sellers & Co., as designer. He was with the Pond Machine Tool Company for eleven years, seven of them as chief designer, and then became mechanical engineer for the Ridgway Machine Tool Company, for which he inaugurated the shop system. After a year with the London Machine Tool Company he came to the United States and entered the employ of the firm with which he was connected at the time of his death.

Mr. Cockburn became a member of the A.S.M.E. in 1910. He also belonged to the Engineers Club of Cincinnati.

Charles Philip Coleman

Charles Philip Coleman, president of the Mount Hope Bridge Company, New York, died of pneumonia and complications in Washington, D. C., on April 13, 1929, on his way with his family to Hot Springs, Va., for a vacation. Mrs. Coleman, the former Miss Helen Douglas Rulison, daughter of the Right Reverend Nelson S. Rulison, formerly Protestant Episcopal Bishop of Central Pennsylvania, whom he married in 1891, and their two sons, Douglas Rulison and Leighton Hammond, both of New York, survive him.

Mr. Coleman was born at Baltimore, Md., on March 28, 1865, the son of William Wheeler and Ellen Gibbons (Hiss) Coleman. He began his education in private schools in Baltimore and later attended the Virginia Military Institute and the Shenandoah Valley Academy, at Winchester, Va. After serving for two years as special apprentice with the Northern Central Railway of the Pennsylvania Railroad, in the Mt. Royal Shops, he entered Lehigh University, from which he was graduated in 1888 with the degree of mechanical engineer.

Soon afterward Mr. Coleman entered the employ of the Lehigh Valley Railroad Company as a junior clerk. With the exception of two years he was connected with this company until 1903, serving as travelling car agent, chemist, engineer of tests, assistant to the general superintendent, and general storekeeper, prior to 1897. In that year he left the company temporarily to act as purchasing agent and assistant to the president of the Bethlehem Steel Company. Returning to the Lehigh Valley Railroad Company toward the end of 1898 he was made its general purchasing agent with headquarters in New York.

In 1903 Mr. Coleman became secretary and treasurer of the Singer Sewing Machine Company, and during his connection with this firm had full charge of the construction of the Singer Building in lower New York. When the Saurer Motor Company was organized in 1910 he was elected its president, and in the following year became chief executive of the International Motor Company, which brought together a number of plants under one management. In 1913 he accepted the office of vice-president of the International Steam Pump Company and when the company went into bankruptcy the following year the Federal Court placed its affairs in the hands of Mr. Coleman and Mr. Grayson M. P. Murphy. When the latter became a vice-president of the Guaranty Trust Company of New York, in 1915, Mr. Coleman was continued as the sole receiver, and was commended by the court for his administration of the company's affairs.

When a reorganization of that company and its associated companies led to the creation of the Worthington Pump and Machinery Corporation in April,

1916, Mr. Coleman was made vice-president, and, in the following year, president. He came to this position during the trying period of the World War, and notwithstanding the handicap of the process of reorganization, succeeded in accomplishing a great deal of effective work for the Government, not only in equipping the destroyers with pumps and air compressors and Shipping Board vessels with marine triple expansion steam engines, but also in the manufacture of shells and other war material.

After the close of the War, Mr. Coleman was active in the development of new lines of product, particularly the Diesel engine in its many forms, the locomotive feedwater heater, and certain types of compressors and centrifugal pumps. He was also an important factor in the development of the first American designed and built two-cycle double-acting Diesel engine, a form particularly adapted for marine propulsion.

In 1926 Mr. Coleman, then chairman of the Board of the Worthington Company, resigned with the intention of retiring from active business, but the Mount Hope Bridge Company, then starting construction on the Mount Hope Bridge between Bristol and Portsmouth, R. I., enlisted his interest, and he took active charge of the work as president of the company.

Mr. Coleman was also president of the Sandusky Bay Bridge Company and a director of Worthington-Simpson Company, Ltd., Anderson, Meyer & Co., and the Foundation Company. He was serving on the Finance Committee of the Foundation Company at the time of his death. He was a member of many clubs, including the Lawyers', St. Nicholas, Railroad, and Automobile Clubs and the Down Town Association of New York, Rockland and Knickerbocker Country Clubs of New Jersey, and the Maidstone and Piping Rock Clubs of Long Island. He became a member of the A.S.M.E. in 1917, and belonged also to the American-Russian Chamber of Commerce, the Society of Colonial Wars, of which he was a director, the Pilgrims, and Sigma Phi fraternity. He was an Episcopalian and a Democrat. His recreations were golf and reading.

Rudolph Conrader

Rudolph Conrader, a pioneer in the introduction of large turret lathes for valve work, and a leader in the designing of control mechanisms for air compressors, both in unloaders and governors, died at his home in Erie, Pa., on January 7, 1929.

Mr. Conrader was born in Erie on November 13, 1858, the son of Marcus and Loretta (Bartles) Conrader, and attended the public schools there. He learned the trade of brass finisher with The Jarecki Manufacturing Company of Erie, and served as foreman of its brass department from 1887 to 1890 and as superintendent of its valve and cock department from that time until he retired in 1925. Since then, as head of the R. Conrader Company, he had devoted himself to the development of some of his later inventions.

Mr. Conrader took out his first patent in 1887 on a reamer grinding machine. He invented and designed the Erie steam engine governor, Erie compressor governor, Erie vacuum governor, and Erie unloader for compressors. Special tools and fixtures, valves, cocks, pumps for oil wells, a process for treating oil wells and oil in wells and in tanks, and a method for saving gasoline by evaporation in storage, are among his other inventions, which number over two hundred. Many of these were manufactured by The Jarecki Manufacturing Company.

Mr. Conrader became a member of the A.S.M.E. in 1893 and was made a Life Member in 1927. He was a 32d degree Mason and a Knight Templar and belonged to the Odd Fellows. He is survived by his widow, Sophia (Smith) Conrader, whom he married in 1887, and by one daughter, Anna (Conrader) Seitz.

Frederic Adams Coons

Frederic Adams Coons, construction superintendent, Public Service Production Company, Newark, N. J., lost his life on June 17, 1929, when he attempted to rescue a drowning man while bathing at Wildwood, N. J. His own death was caused by a blow on the temple from the lifeboat which came to their assistance. His last words were, "Help the other fellow."

Mr. Coons was born at West Hoboken, N. J., on April 27, 1891, the son of William and Mary (Savoye) Coons. He attended Stevens Institute of Technology for two years and in 1913 entered the employ of the Southern Pacific Steamship Company as draftsman in the marine superintendent's office. After a year in that work he spent another year on board the S. S. *Creoble* in the care, operation, and repair of machinery, and combustion analyses.

In 1915 Mr. Coons left the Southern Company to become floor engineer of the power plant in the New York John Wanamaker store, operating and repairing generator units and making layouts for plant changes. The following year he was appointed inspector in the National Workmen's Compensation Service Bureau, and made an inspection of industrial plants in Michigan for perfecting safe working conditions and organizing safety and welfare committees.

During the World War Mr. Coons was an Ensign in the U. S. Navy, in engine-room service on training and transport vessels. In 1919 he returned to civilian work as engineer for the Westinghouse Elec. & Mfg. Co., being located first at the South Philadelphia Works and later in Brooklyn. He was in charge of installation, erection, operation, and repair of marine turbine reduction geared propelling units, turbo-generators, and turbine-driven auxiliaries. In 1924 he became field engineer for the Public Service Production Company, and had since been promoted to the position of construction superintendent. At the time of his death he was engaged in the construction of a power plant in Paterson, N. J.

Mr. Coons was elected an associate member of the A.S.M.E. in 1923. He also belonged to the Newark Safety Council and the National Electric Light Association.

Mr. Coons is survived by his widow, formerly Miss Edna Lux, whom he married in 1920, and by two children, John Lux and Carol Adams Coons.

George Thomas Cousins

George Thomas Cousins, identified with the Ingersoll-Rand Company for a period of thirty years, died suddenly at Great Barrington, Mass., on June 30, 1929, of heart failure.

Mr. Cousins was born in Brooklyn, N. Y., on August 18, 1869. When he was only a few years old his people moved to Norwalk, Conn., where his father and his uncle engaged in the manufacture of shoes. George Cousins grew up in that atmosphere, and early displayed a notable mechanical bent. He studied mechanical drafting through a correspondence-school course, and in that way equipped himself for a position as a designer in the Norwalk Iron Works. In 1897 he was connected with the Hartford Cycle Company as draftsman, and the following year served the C. & C. Electric Co., of Garwood, N. J., in the same capacity. About this time he met Mr. Henry C. Sergeant, of the Ingersoll-Sergeant Drill Company, and was induced by him to enter the drill-designing department of that company at Easton, Pa. From that time on, virtually without a break, Mr. Cousins was identified with the Ingersoll-Sergeant Drill Company and with its successor, the Ingersoll-Rand Company.

After several years at the Easton plant, Mr. Cousins was transferred to the company's head office in New York to promote the sales of rock drills, and in 1906 he went to Butte, Mont., as manager of the branch office there. He was highly successful in introducing the company's rock drills in that mining district. Subsequently, he was in charge of the branch offices in El Paso, Texas, and Johannesburg, South Africa. Owing to ill health, he returned to the United States after three years in South Africa. He took up work again in the New York office in the fall of 1913; and from that time onward he was in the company's Rock Drill Sales Department and had much to do in developing the paving breakers and the submarine drills produced by the Ingersoll-Rand Company. His special service, however, was that of straightening out engineering problems having to do with the operation of rock drills in the field and of showing how best those products could be utilized under specified conditions.

When twenty-four years old he married Miss May H. Taylor of Meriden, Conn., who, with two daughters, survives him.

Mr. Cousins was a member of a number of clubs, the New Rochelle Chamber of Commerce, and numerous engineering societies. He joined the A.S.M.E. in 1915.

Charles C. Davis

Charles C. Davis, architect-engineer for the Imperial Tobacco Co., Ltd., Richmond, Va., whose death occurred on April 8, 1929, was born at Statesville, N. C., on August 25, 1868. He attended the Statesville Academy and Maryland Institute, and served an apprenticeship as a mechanic with the Baltimore & Ohio R. R.

In 1890 Mr. Davis became a mechanic in the Ordnance Department at Washington, where he remained for two years. He spent two years more as foreman of the machine shops of the Richmond Locomotive Works, three years as boiler inspector for the F. & C. of New York, and six years as engineer for the J. Wright Tobacco Co., Richmond.

His association with the Imperial Tobacco Co., Ltd., began in 1903. He planned and supervised the erection of a large number of factories in this country, as well as several abroad; the steam, hydraulic, electric, and heating equipment for these factories was selected and installed under his supervision.

Mr. Davis is survived by his widow. He became a member of the A.S.M.E. in 1927.

Eugene Frank Delery

Eugene Frank Delery, assistant engineer for the Sewerage & Water Board of New Orleans, La., died in that city on November 24, 1929, of cerebral hemorrhage, due to high blood pressure and heart trouble.

Mr. Delery, the son of Frank F. and Cora (Hall) Delery, was born in New Orleans on November 26, 1877. After attending a private school and the Tulane High School, he entered Tulane University, from which he received a B.E. degree in civil engineering in 1899, and a B.E. degree in mechanical engineering the following year.

During the summer of 1899 Mr. Delery served as rodman and computer in connection with the Mississippi River levee surveys and erection. Early in 1901 he worked on irrigation plant design and boiler settings for A. M. Lockett & Co., New Orleans, and later in the year as draftsman on ninety-foot steel tug boats for the Johnson Iron Works of that city. During the next three years, with the exception of six months as manager of the St. Louis Rice Mill, Mr. Delery engaged in private design practice and general machinery design, chiefly for the following firms: Shakespeare Iron Works, John N. Murphy Iron Works, and Frank Paul Barber, New Orleans. From January, 1905, to August, 1908, he was surveyor and construction engineer at the U. S. Naval Station at New Orleans.

From 1908 to the date of his death, Mr. Delery served as assistant engineer of the Sewerage and Water Board of New Orleans. His most important piece of work done in this connection was in the capacity of design engineer in the purification plant extension.

Mr. Delery's contemporaneous private practice covered irrigation plant design, settling tanks for settling out by-products, and miscellaneous machinery design.

He acted as consulting engineer for the architectural firm of Emile Weil on the construction of the Saenger Theater and the Tulane Stadium.

At the time of his death he was associated with the J. F. Coleman Engineering Co., on the construction of the Water Works Plant in the Jefferson No. 2 Drainage District. He was also associated with Henry A. Mentz & Co., consulting engineer of Hammond, La., on the construction of the Metarie Water Works, and was acting as consulting engineer for A. Merrick Blamphin, on some drainage work in St. Bernard Parish, La.

Mr. Delery's mechanical and engineering ability resulted in the invention of the rotary flow pump and impact strainer system. He also had patents on the following appliances: axial flow pump, hydraulic thrust bearing, a machine for forming the depressed orifices in the impact strainer tubes, and other patents on hydraulic appliances pending in the Patent Office.

The impact system of filter underdrains, of which he was the inventor, has proved very successful and is in use in the seventy-two million gallon addition to the New Orleans Filtration Plant, and has been installed in the twenty-four million gallon addition to the Tulsa, Oklahoma, Filtration Plant. These drains

have also been installed at Franklin, Donaldsonville, Monroe, and Lafayette, Louisiana, and Wemoka, Oklahoma, and at the time of his death, were being considered for several large cities.

Mr. Delery was a member of the American Society of Civil Engineers, The American Society of Mechanical Engineers, which he joined in 1921, and the Louisiana Engineering Society. He was also a devout member of the Roman Catholic Church, and was a member of the Society of the Blessed Virgin of the Church of the Immaculate Conception, New Orleans. He died in the Chapel of the Ursuline Convent, where he had stopped for a moment in prayer.

In 1918, Mr. Delery married Edna Marie Fuselier, who, with two small children, survive him.

Daniel J. DeVries

Daniel J. DeVries, retired mechanical engineer, died at his home in Nutley, N. J., on January 1, 1929, after an illness of three years.

Mr. DeVries was born at Lodi, N. J., on June 22, 1877, the son of John and Jemina (Lokker) DeVries, and was educated at Newark, N. J., where he received his early technical training at the Newark Technical School. He served as apprentice machinist with the Novelty Iron Works, Passaic, N. J., from 1889 to 1894, and with the Hewes & Phillips Iron Works in Newark from 1894 to 1897. He was engaged by the latter company for the next two years as machinist and outside erector, and during this time worked upon the first Diesel engines made in the United States, under the supervision of Colonel Meyer and Mr. J. S. McPherson, who was at that time first assistant engineer of the American Diesel Engine Company.

From 1899 to 1903 Mr. DeVries was machine-shop foreman for the Benjamin Eastwood Company, Paterson, N. J., supervising the construction and testing of air compressors. He then spent two years with the J. L. Prescott Co., Passaic, designing and constructing automatic machinery for handling and measuring semi-fluid material, and also designing and installing a new heating system. The following year he was die work foreman for the Passaic Metal Ware Company.

In 1906 Mr. DeVries became chief engineer and master mechanic for the X-Ray Stove Polish Company, Nutley, N. J., which was later absorbed by Lamont, Corliss & Co., New York. During six years with this company Mr. DeVries was engaged in designing and installing machinery for the plant. From 1912 to 1916 he was in business for himself as heating and consulting mechanical engineer, and ran a small machine shop for building experimental machinery for manufacturing a variety of products, including artificial leather, candy, and substitutes for carbon black and pigments.

In 1916 Mr. DeVries was engaged by the Magor Car Corporation, Clifton, N. J., as master mechanic and maintenance engineer. He designed and installed a new heating plant for the company, and carried on a great deal of research work. In 1919 he was delegated to conduct tests at the Bureau of Standards in Washington to show the efficiency of an oil burner made by the company for the Government in connection with field kitchen work. He was obliged to retire from business in 1926.

During the last few years of his life Mr. DeVries became very much interested in the efficiency of steam heating systems, and in addition to doing consulting work along these lines he was granted a patent on a flash type boiler and methods for controlling it, which, however, his illness prevented him from putting into marketable form.

He also became interested in raising dahlias, of which he grew many varieties, and had developed a small business in bulbs and cut flowers, under the name of the West Nutley Dahlia Garden.

Mr. DeVries was active in town affairs, organizing a local fire department and serving three years on the town council, where he had charge of the Department of Roads and Public Improvements. He belonged to the Masonic fraternity and became a member of the A.S.M.E. in 1920.

Mr. DeVries is survived by his widow, Emma (Hueber) DeVries, whom he married on November 10, 1898, and by two sons, John Louis and Raymond E. DeVries.

Willis H. Diefendorf

Willis H. Diefendorf, president and treasurer of the Diefendorf Gear Corporation, Syracuse, N. Y., since its organization in 1920, died at his home on May 25, 1929. He had been in failing health for several months.

Mr. Diefendorf was born on December 4, 1869, at Vienna, Oneida County, New York. He was the son of Dr. S. C. and Ella C. Diefendorf. He received his early education at Onondaga Valley Academy.

After graduation from that institution, he entered the employ of the Straight Line Engine Company. After being with this concern a short time, he became affiliated with the New Process Rawhide Company, which his friend, the late Thomas W. Meachem, was just organizing. During the infancy of the company, he found the acquaintance of John E. Sweet, which he had made while he was connected with the Straight Line Engine Company, to be an invaluable aid in solving many problems which confront the engineer of a small concern in a new and unproved endeavor. In fact, due to this contact, he was sometimes referred to as one of John Sweet's "boys." It was largely through his efforts in persuading and proving to the officers of the New Process Rawhide Company that there was a future in the metallic gear field, as well as in the rawhide branch of the gearing industry, that the New Process Rawhide Company, now known as the New Process Gear Corporation, became one of the major concerns in industrial Syracuse. Mr. Diefendorf continued his association with the firm until 1920 when it was taken over by the John N. Willys interests, and he had been in its employ nearly thirty years, and was one of the directors of the company as well as chief engineer.

After his retirement from the New Process Gear Corporation in 1920, Mr. Diefendorf organized the Diefendorf Gear Corporation, which in 1923 purchased and moved into the plant of the Economy Foundry of E. C. Stearns. In 1924 the property, plans, and goodwill of the Meachem Gear Corporation were also purchased.

Mr. Diefendorf was an active worker in the St. Paul's Episcopal Church, and a 32nd degree Mason. He was a member of the Syracuse Chamber of Commerce, the Rotary Club of Syracuse, the Technology Club, the Executive Committee of the American Gear Manufacturer's Association and the A.S.M.E., which he joined in 1904, and was also a past member of the Society of Automotive Engineers.

He had contributed several special articles on gearing subject to the *American Machinist*.

Mr. Diefendorf is survived by his widow, Mrs. Mary A. Diefendorf, one son, Donald W., a student at the Massachusetts Institute of Technology, and his mother.

Desmond Cecil Patrick Dowling

Desmond Cecil Patrick Dowling, whose death occurred on May 4, 1929, was the eldest son of Patrick A. E. Dowling, formerly a well-known professor of mathematics in Dublin and for many years registrar of the Royal College of Science, Dublin, and Kathleen Casey, whose father, John Casey, had been professor of higher mathematics and mathematical physics at the Catholic University of Ireland and was author of numerous text books on these subjects.

Desmond Dowling was born at Dublin on October 20, 1895. He attended the Catholic University School, Dublin, in early boyhood, then passed to Clongowes Wood College, where he remained for four years, and made a scholastic record worthy of his ancestry. He obtained Civil Service and Entrance Scholarships in the National University, where he studied for two years. He then entered the Engineering School of the College of Science, where he gained a Royal Scholarship and several prizes. He obtained his diploma in mechanical, civil, and electrical engineering in 1919.

Late in that year Mr. Dowling accepted a position as draftsman in the Ford factory in Cork, but resigned after a short time to devote himself fully to military work. He was deeply interested in Irish politics and during his college years had been active in the organization of the Engineering Corps of the Irish Republican Army in which he ranked as Captain. He was in active service during hostilities between England and Ireland in 1920 and 1921, and

was sent to Germany in 1921 to purchase arms for the Irish Republican Army, spending some time in Berlin. After the Treaty establishing the Irish Free State had been ratified he became Captain and later Commandant of Engineers in the Irish Free State Army, from which he retired in 1926 after ten years' service. During the latter part of this time he was in charge of the erection of power plants, water supply works, etc.

Mr. Dowling came to the United States in November, 1926, and was connected for a time with the Dubiliev Condenser Company, New York, N. Y., as draftsman. Subsequently he was sales engineer for the Metropolitan Refining Company and the Alfit Packing Company, both of New York. At the time of his death he was employed in the same capacity by the Waukegan Engineering Company, New York.

Mr. Dowling was an excellent linguist, speaking Irish, French and German fluently, and had a thorough knowledge of Latin. He was also well read in mathematical and scientific subjects. He wrote well and was associated with Arthur Griffith as assistant editor of *Nationality* for some time. He was a good chess player, swimmer and boxer, and a keen tennis player.

Mr. Dowling became an associate-member of the A.S.M.E. in 1928.

Charles Agustas Dwinell

Charles Agustas Dwinell, chief engineer, Baldwin Locomotive Works of Cuba, Havana, died in that city on November 12, 1929, after a few weeks' illness.

Mr. Dwinell was born at Middletown, Ohio, on August 9, 1874. After attending the Nashville, Tenn., High School, he served an apprenticeship as a machinist with the Louisville & Nashville R. R. He was connected with this road until 1904, working as foreman and locomotive engineer. He then became foreman for the Baldwin Locomotive Works.

In 1907 Mr. Dwinell was sent to Cuba to supervise the erection of locomotives there. Upon his return the next year he was appointed general foreman of the brass foundry for the company, and in 1910 became general inspector for the entire plant. The following year he went to Egypt to take charge of erecting two locomotives there, after which he went successively to Chile, Peru, and Santo Domingo. In 1914 he was appointed service engineer for Cuba, where he remained until his death. In addition to placing in service all new Baldwin locomotives in that country and assisting the sales department, he served the railroads as consulting engineer in the arrangement of their roundhouses and repair shops.

Mr. Dwinell's membership in the A.S.M.E. dated from 1921.

Frederick H. Engelhard

Frederick H. Engelhard was born on May 23, 1873, at West Springfield, Mass., the son of Frank and Flora (Koegel) Engelhard. After completing grammar school he served as an apprentice in the toolmaking trade with the Duesmore Typewriter Company, of Springfield, Mass., from 1888 to 1891. During the next three years he was engaged in experimental work for the Springfield Brass Company.

In 1894 Mr. Engelhard entered into partnership with his father, helping to organize the Hercules Float Works, Springfield, with which he was connected from that time until his death on March 26, 1929. He had charge of tool and fixture work, screw machine and turret lathe work, and general oversight of manufacturing copper and brass work of all kinds. He specialized on the manufacture of floats and air chambers for hydraulic and steam apparatus, sheet metal working, and electrodeposition of metals, and invented a number of improvements in machinery for these purposes. Since 1920 he had been almost entirely engaged in experimental work.

Mr. Engelhard became an associate of the A.S.M.E. in 1920 and was promoted to full membership in 1924. He also belonged to the Engineering Society of Western Massachusetts and the Masonic fraternity.

In 1905 Mr. Engelhard married Rosa Schneelock, who died in 1925. There are no surviving children.

Harvey Cole Estep

Harvey Cole Estep, vice-president of the Penton Publishing Company, died suddenly of heart failure on September 30, 1929, as he was entering the Penton Building in Cleveland, Ohio, where his offices were located. Mr. Estep was one of the leading figures among the nation's industrial publishers, his progressive influence and ability extending beyond the sphere of the Penton publications to the business and technical publishing field at large, both in this country and in England.

He was born at Stampede Tunnel, Washington, on September 27, 1886, the son of Harvey C. and Gertrude M. (McCausland) Estep. He was educated in public schools and at the University of Minnesota where he was graduated in 1908 with the degree of mechanical engineer. He was a member of the honorary fraternity, Tau Beta Pi.

Mr. Estep joined the staff of the Penton Publishing Company in June, 1908, as assistant to R. T. Kent, engineering editor of *Iron Trade Review*, representing the interests of the company at Seattle until 1910. In that year, Mr. Estep was promoted to the office of Chicago editorial representative where he served until 1914, when he was transferred to Cleveland as associate editor of *The Foundry* and engineering editor of *Iron Trade Review*. He served in these capacities until 1917, taking on the additional task of editor of *Marine Review* in 1915, and holding the title until 1919. During the years 1918 and 1919, he also filled the office of editorial director of the Penton Publishing Company.

Mr. Estep served in 1918 as secretary of the cast aluminum committee of the Army Ordnance Department. Immediately following the World War, he went to London, England, to establish the Penton Publishing Company of England, with headquarters in London and branch offices in Paris and Berlin. He returned to the United States in 1924 and assumed his executive duties as vice-president of the company. During his years in England he was closely identified with the direction and development of *Daily Metal Trade*.

Mr. Estep also was president of the Johnson Publishing Company, Cleveland, publisher of *Machine Design*. The Johnson company is affiliated with the Penton Publishing Company.

Mr. Estep was a member and director of the American Foundrymen's Association. He had served as editor of its *Transactions* and as chairman of its papers committee and its committee on international relations. He initiated and fostered the exchange of papers on foundry subjects between the Association and European organizations devoting their attention to similar constructive effort.

Mr. Estep was also secretary and treasurer of the Foundry Equipment Manufacturers' Association, member of the American Iron and Steel Institute, The American Society of Mechanical Engineers, which he joined in 1914, British Iron and Steel Institute, Institute of British Foundrymen, Association Technique de Fonderie de France, the Engineers Club of London, and several local clubs. He was active in the work of the Associated Business Papers, Inc., and served on various committees of the Cleveland Chamber of Commerce.

Mr. Estep was a writer of unusual ability and was a frequent contributor to the Penton publications as well as to the programs of the societies to which he belonged. He is survived by his widow, Mrs. Helen Lynch Estep, whom he married in 1909, and by a son, Edward.

Ferdinand Foch

Ferdinand Foch, Marshal of France, died in Paris on March 20, 1929. An illness which had been stubbornly fought with soldierly determination and characteristic optimism ended suddenly and peacefully in a heart attack. Thus passed one of the great generals of history who had commanded the Armies of the Allies during the dark days of March, 1918, and who had met in November of that year in the historic railway car in the Forest of Compiègne the German envoys who had come to arrange terms for an armistice.

Marshal Foch was born on October 2, 1851. His father was a civil servant under the régime of the Second Empire, and his grandfather had been a general under the great Napoleon. The outbreak of the Franco-Prussian war found him at school in Metz where his family was then living. After seeing the Germans at Metz the thought of revenge became fixed in his mind, and he concentrated the efforts of his entire life on the preparation of France for what he considered would be an inevitable war.

With an aptitude for mathematics, but without any apparently marked genius for so stupendous a task as he had set for himself, he began his military career. Following his services as a subaltern in the War of 1870, he entered the École Polytechnique in 1871, from which he was graduated into the artillery, forty-fifth out of a class of seventy. In 1875 he was commissioned a captain of artillery and nine years later entered the École de Guerre as a student. In 1896 he became professor of strategy and general tactics at the war college and in 1907, after some time spent with his regiment, he returned as Director of the École de Guerre at the request of Premier Clemenceau. His lectures are published in two books, "The Conduct of War," and "The Principles of War." He was regarded as a theorist and philosopher and a mathematician of a high order, but it was not until the beginning of the Great War that the French realized that in Foch they had a great military leader.

"The moral factor is the most important element in war," Foch wrote, "the will to conquer sweeps all before it. There is a psychological phenomenon in great battles which explains and determines their results. One hundred thousand men leave 10,000 of their number dead upon the ground and acknowledge themselves beaten; they retreat before the victors who have lost as many men, if not more. Neither one side nor the other side knows when they withdraw what its own losses have been nor how heavy those of the opposing force; therefore, it is not on account of material damage, still less from any possible computation of figures, that the losers give up the struggle."

Foch introduced a new conception into the art of warfare. It was not, he maintained, an exact mathematical science, but an art in the application of which it was absolutely necessary to have a fundamental knowledge of general principles.

The inevitable war for which he had prepared himself came in 1914. On May 15, 1917, he became Chief of Staff of the Army of France and technical adviser to the government. On March 25, 1918, he was made Generalissimo of the Armies of the Allies, and in August of the same year, Marshal of France.

The part played by Foch in the World War is a matter of historical record. His genius as a general must be appraised by students of military science competent to undertake such an evaluation. The dramatic scenes in the Forest of Compiègne were a climax to the career which he had devoted to the service of France. "Mr. President," he said to Clemenceau when he returned to Paris, "my work is finished. Your work begins." The soldier's work gave way to the statesman's.

On December 13, 1921, at the completion of a tour of the United States as guest of the American Legion, Marshal Foch was made an honorary member of the four National Engineering Societies, the A.S.C.E., the A.I.M.E., the A.S.M.E., and the A.I.E.E. Unanimously, the governing bodies of these societies aggregating 45,000 members conferred this signal honor, the only one of its kind, in expression of the "appreciation of American engineers for the unmatched services of this master of engineering principles, cooperation and coordination."

Howard Stanley Folker

Howard Stanley Folker, chief engineer, National Safety Appliance Company, San Francisco, Calif., was born at Suresness, France, on March 26, 1888. His parents were George N. and Alice E. (Roberts) Folker. His education was obtained at the Wilmerding School of Industrial Arts and through the International Correspondence Schools.

During vacations while still in school Mr. Folker did some surveying for the Tamalpias Land & Water Co., and subsequently he worked on bridge and road

construction and spent a short time with the California Electric Works, assembling switchboards. From 1906 to 1912 he was connected with the Mill Valley & Mt. Tamalpais R. R. as a machinist, locomotive fireman, and engineer. He did some air brake work and assisted in the design and construction of a railway motor car and steel railway cars.

Following this experience Mr. Folker entered the employ of the National Safety Appliance Company. He was in charge of the development of electro-pneumatic train control appliances, and many of the appliances installed on railroads by the company were designed and patented by him.

Mr. Folker became a member of the A.S.M.E. in 1925. He is survived by his widow, Ruth Waller Folker, whom he married in 1913, and by two children, Winifred R., and Howard S., Jr. His death occurred on August 11, 1929.

James Wheeler Fuller

James Wheeler Fuller, president of the Fuller Company, with offices at Catasauqua, Pa., died on April 4, 1929, at the St. Luke's Hospital in San Francisco, Calif., of the "sleeping sickness," which developed while he and Mrs. Fuller were returning from a Hawaiian trip.

Colonel Fuller was born on April 2, 1873, at Catasauqua, the son of James Wheeler and Katherine (Thomas) Fuller. After completing his schooling at the Haverford, Pa., Preparatory School he served an apprenticeship in the molders' and machinists' trades with the McKee Fuller Company, of which his father was president. This company subsequently became The Lehigh Car, Wheel & Axle Co., and then the Fuller-Lehigh Company. Colonel Fuller worked through the different departments in various capacities and upon the death of his father was elected president of the Fuller-Lehigh Company. He was also president of the Fuller Engineering Company, which designed and constructed many lime and cement plants throughout the United States and foreign countries.

In January, 1926, these companies were sold to the Babcock & Wilcox Co., and Colonel Fuller served as chairman of the board until the first of April, when he retired and organized the Fuller Company to handle the Fuller-Kinyon transport system used extensively in the cement, lime, and kindred industries.

Colonel Fuller was a pioneer in the development and use of pulverized fuel and wrote a number of articles on the subject, particularly in connection with the use of pulverized fuel in stationary boilers and metallurgical furnaces. He also applied for and obtained a number of patents covering the preparation and use of pulverized coal, as well as patents covering processes and equipment used in the cement industry. During the World War the Fuller-Lehigh Company made pulverized coal machinery for boilers, locomotives, and all kinds of metallurgical furnaces for the Government.

Mr. Fuller was a Republican and served on the military staff of Governor John K. Tenor as Colonel. He was a trustee of the Board of Directors of the Haverford School, a member of the Pennsylvania State Chamber of Commerce, and belonged to the American Iron and Steel Institute, American Society for Testing Materials, International Railway Association, American Institute of Mining and Metallurgical Engineers, and the A.S.M.E., which he joined in 1910. He was an Elk, and in addition to a number of country clubs, belonged to the Engineers Club of New York, Manufacturers Club of Philadelphia, and Congressional Club of Washington, D. C.

He was president of the Allentown Portland Cement Company and Valley Forge Cement Company, both of which companies had headquarters at Catasauqua, and a director of the Wahnetah Silk Company, of Catasauqua. He had also served as a director of the Railway Steel Spring Company until it was bought by the American Locomotive Company in 1926, and of the Empire Steel & Iron Co. until its sale to the Replogle interests.

Colonel Fuller maintained a large estate at Catasauqua where he had a herd of nearly one hundred registered Guernsey cattle and a stable of thoroughbred horses which won many blue ribbons at exhibits.

Colonel Fuller is survived by his widow, Dorothy (Stahlkop) Fuller, whom he married in 1917, and by three children, James W., Charlton Thomas, and Emily.

Henry Edward Genz

Henry Edward Genz, associate professor of mechanics at the Georgia School of Technology, Atlanta, Ga., died on February 16, 1929. He was born at Elizabeth, N. J., on September 1, 1897, the son of Alexander J. and Catherine (O'Brien) Genz. He attended the public schools of Elizabeth and later entered the Sheffield Scientific School of Yale University, from which he received the degree of Ph. B. in 1918.

After a brief training period he received his commission as ensign in the U. S. Navy and served on the steamship *Kanawa* until after the close of the World War.

His first position was with the Downey Shipbuilding Company, as marine erecting machinist. Following that he was draftsman, working on pipe and machine layouts, first for the Staten Island Shipbuilding Company, and then for the Pensacola Shipbuilding Company. He then spent several months in research work for the Federal Shipbuilding Company.

His teaching career began in the fall of 1920 as assistant professor of mechanics at the Georgia School of Technology. He was advanced to associate professorship three years later.

Professor Genz married Maude Exa Pickard in 1922 and they had one son, Henry Edward Genz, Jr.

Professor Genz became a junior member of the A.S.M.E. in 1921. He also belonged to the Society for the Promotion of Engineering Education, and the Sigma Xi, Phi Kappa Phi, and Tau Beta Pi fraternities.

Arthur Gibson

Arthur Gibson, consulting mining engineer, died on January 29, 1929, in San Francisco, Calif., where he had spent the latter part of his life.

Mr. Gibson was a native of Sweden, having been born at Gothenburg on November 12, 1867, the son of David and Ida (Heckscher) Gibson. He was graduated from the Chalmers Technical Institute of Gothenburg with degrees in mechanical, civil, mining, and architectural engineering. He acquired his early shop experience with the Maxim, Nordenfelt Gun & Ammunition Co. in London. Late in 1889 he came to the United States and entered the employ of the De La Vergne R. & M. Co., New York, N. Y., as assistant to the superintendent. From there he went to Chicago where he worked in 1892 as draftsman for Fraser & Chalmers and in the chief engineer's office at the World's Fair.

Since 1892 Mr. Gibson had engaged in private practice as consulting engineer. During the first few years he was located at Windom, Minn., designing water works, electric light plants, and sewer systems for small towns, and also preparing plans and specifications for bank, store, and residence buildings. For four years he also served as county surveyor for Cottonwood County, and in 1896 prepared and published a plat book of that county.

In 1898 he moved to Dawson, Canada, where he engaged in hydraulic engineering, land and mine surveying, and placer mining for a year. He then opened an office in Nome, and for fifteen years took part as consulting engineer in the mining development of Alaska. His work included surveying and engineering pertaining to mining improvements, management of steam and hydroelectric plants, hydraulic engineering, placer mining, and dredging. He was employed as expert engineer witness in a large percentage of all mining suits tried in the Federal Court at Nome between 1900 and 1913, and was special observer in charge of the U. S. Weather Bureau office there from 1907 to 1913. During his last two years at Nome he was Swedish Consul for Alaska.

Since 1913, except from 1917 to 1920, when he was superintendent of the Atlas Wonder Mining Company, Wonder, Nev., Mr. Gibson had maintained an engineering office in San Francisco. He examined and reported on mines throughout California. He was secretary to the Commissioner General for Sweden during the Panama-Pacific International Exposition in 1915, in charge of the Swedish building and exhibits.

Mr. Gibson designed various surveying instruments and a full line of magnetometers for locating and examining magnetic ore deposits. A number of articles on the use of the latter instrument in mining, as well as descriptions of other phases of his work, were published in periodicals devoted to mining engineering.

Mr. Gibson had been a member of the A.S.M.E. since 1892 and belonged to the Engineers Club of San Francisco and the Masonic fraternity. He is survived by his widow, Mabel Gibson, and by two children.

Bernard Glathe

Bernard Glathe died in Berlin on August 27, 1929, during an European trip. He was born at Harburg, Germany, on January 17, 1869, the son of Henry Bernhard Glathe and Louise (Peterson) Glathe. He attended evening sessions at the Gargsherrie Science School and West of Scotland Mining College, and at the same time secured general engineering training at the Speedwell Iron Works, Coatbridge, Scotland, of which W. V. V. Lidgerwood was proprietor. He also served an apprenticeship with the Lidgerwood Manufacturing Company, of New York and Brooklyn, as patternmaker, and later worked for that company two years in that capacity and four years as draftsman.

Nine years were spent with the Mollenhauer Sugar Refining Company, of Brooklyn, and two years with the Fajardo Sugar Company, of New York and Porto Rico, in construction work. In 1907 he became chief engineer for The Cuban-American Sugar Company, of New York and Havana, Cuba, a position which he held at the time of his death. He was in charge of all work pertaining to the design, construction, and operation of the company's plants in Cuba and the United States. The "Central Delicias" factory, one of the largest raw cane sugar factories in the world, was built under his supervision.

Mr. Glathe became a member of the A.S.M.E. in 1918. He had also been a member of the Engineers Club in New York and of the Asociacion de Tecnicos Azucareros de Cuba. He was an ardent stamp collector, specializing in United States and German stamps. He is survived by his widow, Sophie Anna (Posbergh) Glathe, and by two children, a son and a daughter.

George Alfred Goodenough

George Alfred Goodenough, professor of thermodynamics at the University of Illinois, died suddenly of heart disease at his home in Urbana on September 29, 1929.

Many generations of engineering students at the University of Illinois have come under Professor Goodenough's inspiring and kindly influence, and many graduates have testified to their appreciation of his teaching and friendly interest in their work as students, and in their careers since graduation.

Professor Goodenough's success as an engineering teacher was based upon thorough preparation in the subject which he taught, and great enthusiasm in his presentation of the subject in the classroom. More, perhaps, than this, he was a man of the broadest human sympathies. His judgment was always highly regarded, for he had the ability to present his ideas in a clear, logical, dispassionate, and convincing manner which carried with it his sincerity and honesty of purpose.

Professor Goodenough was born at Davison, Mich., on May 3, 1868, the son of James Webster and Eliza (Gifford) Goodenough. He became a student in mechanical engineering at the Michigan Agricultural College in 1887, and received the degree of bachelor of science from that institution in 1891. In 1891 and 1892 he took graduate work at the University of Michigan, and in 1900 he received the professional degree of Mechanical Engineer from the University of Illinois.

Following his graduation from the Michigan Agricultural College, he remained there for two years as instructor in mechanics. He was connected with the International Correspondence Schools of Scranton, Pa., from 1893 to 1895, and from 1897 to 1899, preparing textbooks in various branches of engineering.

From 1895 to 1897 he was instructor in mechanical engineering at the University of Illinois, and in 1899 was appointed assistant professor of mechanical engineering. Seven years later he became associate professor of mechanical engineering, and in 1911 was appointed professor of thermodynamics. To fill a vacancy in 1909, Professor Goodenough served for two years as acting head of the Department of Mechanical Engineering.

In addition to his success as a teacher, he was recognized as one of the most productive contributors to the literature of engineering. His chief interests were in the theoretical problems of engineering science, and he devoted much of his time to the study of higher mathematics, mechanics, and thermodynamics. He was one of the foremost authorities on thermodynamics in America.

He had served the General Electric Company as consulting engineer in connection with the work of its Turbine Research Department, and in collaboration with Prof. A. C. Willard assisted in solving the ventilation problems of the Hudson Vehicular Tunnels under the Hudson River.

In 1908, in collaboration with Dr. E. J. Townsend, Professor Goodenough published a book entitled "First Course in Calculus," and two years later one on the "Essentials of Calculus." In 1911, his book on "Principles of Thermodynamics" was published, and it has since come to be used extensively in many of the foremost technical schools of America. In 1915, his book on "Properties of Steam and Ammonia" was published, and it is now regarded as one of the standards for use in the computations involved in steam engineering and in refrigeration.

In addition to the books which Professor Goodenough published, he contributed, collaboratively, a number of excellent bulletins to the list of those issued by the Illinois Engineering Experiment Station. Among these are: "An Extension of the Dewey Decimal System of Classification Applied to Engineering Industries," "The Strength of Chain Links," "The Properties of Saturated and Superheated Ammonia Vapor," "Thermal Properties of Steam," "An Investigation of the Maximum Temperatures and Pressures Attainable in the Combustion of Gaseous and Liquid Fuels," and "A Thermodynamic Analysis of Internal-Combustion-Engine Cycles."

Professor Goodenough also contributed to a number of standard engineering reference books, preparing a section on thermodynamics for Marks's "Mechanical Engineers' Handbook," and another for the American Civil Engineers Handbook. In addition to the books, bulletins, and articles specifically mentioned, he contributed numerous scientific papers to the proceedings of engineering societies and to the technical press.

However, his hours were not wholly confined to reflections upon the possibilities of the Carnot cycle, temperature-entropy diagrams, and steam tables. He enjoyed reading Dickens, Thackeray, and Scott, whose literature was a popular part of his large private library, and he was fond of music. In summer he was frequently seen on the golf course at Urbana.

Professor Goodenough attained great prominence in the eyes of the general public as arbitrator of "Big Ten" athletics, in which capacity he served twenty-three years. He had been representative of the University of Illinois on the Western Intercollegiate Athletic Conference since 1906, and was chairman of the Eligibility Committee of the University and of the Committee on Revision of Rules.

He became a member of The American Society of Mechanical Engineers in 1919. He was a member of the Society for the Promotion of Engineering Education, and belonged to the Phi Gamma Delta, Sigma Xi, Tau Beta Pi, and Sigma Tau fraternities.

Professor Goodenough is survived by his widow, Elizabeth (Kitzmiller) Goodenough, whom he married in 1894.

George Frederick Goodnow

George Frederick Goodnow, consulting engineer of Chicago, Ill., whose death occurred on April 9, 1929, at Highland Park, Ill., was the son of O. E. and Susan (Tilden) Goodnow. He was born at Rochester, Vt., on

November 15, 1863, but obtained his education in Iowa, where he attended elementary and high school and Iowa State College, and at the Massachusetts Institute of Technology, where he did graduate work.

Mr. Goodnow's first position was with the Lynn Gas & Electric Co., Lynn, Mass., where he secured employment after completing his studies at M. I. T. In 1889 he became superintendent of the Dedham & Hyde Park Gas & Electric Co., Dedham, Mass. Five years later he removed to Cedar Rapids, Iowa, where he accepted a similar position with the Cedar Rapids Gas Light Company.

In 1899, Mr. Goodnow made another change, going to Waukegan, Ill., as general manager of the North Shore Gas Company. In 1904 he became president of the El Paso Gas & Electric Co., El Paso, Texas, and in 1916 president of the North Shore Gas Company. Three years later he was elected president of the Jacksonville Gas Company, Jacksonville, Fla.

Among other firms of which Mr. Goodnow had been officer or director, were the N. Y. & Richmond Gas Co., Staten Island, N. Y.; Austin Gas Light Company, Austin, Texas; Benton Harbor-St. Jos. Gas & Fuel Co., Benton Harbor, Mich.; and Standard Silica Company, Garard Trust Company, and Northern Illinois Coal Company, all of Chicago.

He established the consulting engineering firm of Geo. F. Goodnow & Co., Inc., Chicago, of which he was president, in 1923. He designed and constructed gas plants and properties for a large number of plants in the Middle West and other sections of the country, and acted in an advisory capacity on investments in the gas industry. A gas mask of his invention has been patented.

Mr. Goodnow became a member of the A.S.M.E. in 1921. He also belonged to the American Gas Association, Illinois Gas Association, Chicago Historical Society, Art Institute (Chicago), and several clubs in New York and Chicago.

A number of articles on the gas industry were written by Mr. Goodnow for the technical press.

Mr. Goodnow is survived by his widow, Anna L. (Nichols) Goodnow, whom he married in 1889, and by two sons, Albert Clarke and George Nichols Goodnow.

Emil Hjalmar Gren

Emil Hjalmar Gren, whose death from pneumonia occurred at South Amboy, N. J., on January 25, 1929, was born at Bangor, Me., on July 29, 1899. He was the son of Gustaf Theodor and Jennie Ames (Brown) Gren. His early education was obtained in the schools of Somerville, Mass., and he was graduated from the Bangor High School in 1919. He attended the University of Maine for one year and later the Brooklyn Polytechnic Institute. He also took courses in analytical chemistry and chemical engineering through the International Correspondence Schools.

Mr. Gren was instructor in mathematics and sciences at the Unity High School, Unity, Me., for one year, and then was successively employed by the Eastern Manufacturing Company, Brewer, Me.; Western Electric Company, New York, N. Y.; Proctor & Gamble Co., Port Ivory, S. I., N. Y.; Pittsburgh Testing Laboratory, New York, N. Y.; Magnolia Metal Company, Elizabeth, N. J.; Control Laboratory, The Flintkote Company, East Rutherford, N. J.; and Chemicals, Inc., South Amboy, N. J.

Mr. Gren became a junior member of the A.S.M.E. in 1924. He also belonged to the American Chemical Society, the American Association for the Advancement of Science, the Sons of the American Revolution, and the Society of Mayflower Descendants.

Matthew Griswold, Jr.

Matthew Griswold, Jr., who retired as manager of the Erie, Pa., Works of the General Electric Company on January 1, 1929, because of ill health, died at his home in Erie on February 10, 1929.

Mr. Griswold was born in Erie in November, 1866, the son of Matthew Griswold and Sarah L. (Olmstead) Griswold. He was graduated from Shef-

field Scientific School, Yale, in 1888, and after two years of post-graduate work he obtained the degree of M.E. Upon leaving college he became associated with the Griswold Manufacturing Company, which he served as president and general manager for a number of years.

On November 11, 1911, he severed his connection with the Griswold Manufacturing Company to become acting manager of the Erie Works of the General Electric Company. He was made manager of the plant on December 12, 1911.

In 1893, Mr. Griswold married Jessie Gardiner Black, who survives him, together with four children—a daughter, Inglis Griswold; and three sons, Dr. Matthew Griswold, Wm. Black Griswold, and Roger Wolcott Griswold.

Mr. Griswold was very active in civic affairs and was a member of the City Planning Commission and a member of the Boards of the Erie Manufacturers' Association, Hamot Hospital, Erie Trust Company, Chamber of Commerce, and the Griswold Manufacturing Company.

He became a member of the A.S.M.E. in 1929. He had been vice-president of the National Founders Association, and for his services to Italian-Americans of Erie he was made Cavaliere of the Order of Vittorio Emanuele. Shortly before his death, the Public Square before the new Union Station at Erie was named Griswold Plaza in his honor.

George T. Gwilliam

George T. Gwilliam, president of the Gwilliam Company, manufacturers and dealers in ball and roller bearings, with plants in Philadelphia, Pa., and Brooklyn, N. Y., died from heart disease at the Mountainside Hospital in Montclair, N. J., on May 25, 1929. Mr. Gwilliam had made his home at the Union League in Philadelphia for twenty-seven years, but on account of ill health was removed to the home of his son, Mark R. M. Gwilliam, in Bloomfield, N. J., several months before his death. Two other sons, John and George T. Gwilliam, Jr., survive him.

Mr. Gwilliam was a native of Philadelphia, where he was born on August 28, 1860, the son of John and Anna (Kirkpatrick) Gwilliam. His education was obtained in public and technical schools in that city, and his early engineering experience as transitman for the Mexican National Construction Company, in railroad work in Mexico, and as recorder, inspector, and assistant engineer in surveying hydrography, and construction work for the U. S. Engineer Department. From 1885 to 1890 he engaged in consulting and contracting work in sanitary and civil engineering.

From that time until he founded his own business in 1912, Mr. Gwilliam was connected with Philadelphia firms as follows: Office manager, C. W. Hunt & Co. (1890-1891); assistant engineer, Wilson Bros. & Co., engineers and architects (1891-1892); engineer, Vulcanite Paving Company (1893-1898); engineer, Geo. F. Payne Co., contractors and builders (1898-1900); sales engineer, Link Belt Engineering Company (1900-1905); Philadelphia manager, Webster Mfg. Co. of Chicago (1905-1907); and resident manager of the Hess Bright Mfg. Co. of New York (1907-1912).

Mr. Gwilliam belonged to the United States, New York State, and Philadelphia Chambers of Commerce, and had been a member of the A.S.M.E. since 1891. He was treasurer of the Engineers Club for twenty-five years. He also belonged to the Corinthian Yacht and Philadelphia Yacht Clubs, and had commanded yachts in many important races on the lower Delaware River.

Donald Ackerman Hampson

Donald Ackerman Hampson, who recently had retired as superintendent of the Morgans & Wilcox Mfg. Co., of Middletown, N. Y., to devote himself to technical writing and consulting engineering, died in Middletown on August 3, 1929, from anemia.

Mr. Hampson was a native of Middletown, where he was born on November 19, 1883, a son of Samuel D. and Mary (Ackerman) Hampson. He at-

tended the schools of Middletown and later took special courses in mechanical engineering through the International Correspondence Schools, and at the University of Michigan. He served an apprenticeship with the Morgans & Wilcox Mfg. Co., manufacturers of printing machinery and contract builders of miscellaneous machines and tools, and remained with the concern until early in 1928. His work as mechanical engineer and superintendent included designing, estimating, selection of manufacturing equipment, supervision of manufacturing, and training of apprentices. He not only designed machinery for the printing industry and equipment for manufacturing it, but as consulting engineer for other companies worked out designs for a variety of machinery and tools, including conveying machinery, drills, grinders, and planers.

Mr. Hampson was greatly interested in fire prevention work, conducted tests of equipment in Middletown and Monticello, and lectured and wrote on the subject. He also did considerable work in the conversion of light motor trucks for use in railway passenger service for light traffic.

Since his retirement from the Morgans & Wilcox Mfg. Co. he had continued to put the results of his wide experience and knowledge into articles for leading technical periodicals, a work to which he had given considerable time for some years.

Mr. Hampson belonged to the Grace Episcopal Church of Middletown, where he had been a member of the choir for many years, and had also been tenor soloist at St. Paul's. He was a charter member and former president of the Apollo Club (one of the Associated Glee Clubs of America). He belonged to the Masonic fraternity, the Power Transmission Association, and the A.S.M.E., of which he was elected an associate-member in 1916 and a full member five years later.

Mr. Hampson is survived by one sister, Miss Helen G. Hampson, of Middletown, N. Y.

Stewart Henry Hartshorn

Stewart Henry Hartshorn died at his home in Short Hills, N. J., after a lingering illness, on December 14, 1929.

He was born at Short Hills on April 20, 1876, the son of Stewart and Joanna (Randall) Hartshorn. He was educated in France and at Harvard University, from which he was graduated with an A. B. degree in 1898.

He had been vice-president of the Stewart Hartshorn Co. of New York, N. Y., since 1900, and was also a director of the Oswego Shade Cloth Co., Oswego, N. Y., a director of the Joanna Cotton Mills, Coldville, S. C., and a director of the First National Bank of Millburn, N. J. His engineering abilities were devoted to practical inventions used for the modernizing of the manufacturing interests with which he was connected.

He became a member of the A.S.M.E. in 1922 and was also a member of the Society of Automotive Engineers, the Baltusrol Golf Club, the Harvard Clubs of New York and New Jersey, and various Masonic organizations.

In 1900, in London, England, he married Magdalene Southern, who died in 1910.

In 1915, at Farmington, Conn., he married Jennette Cowles Vorce. He is survived by his widow and two children, a daughter, Catherine Jennette, and a son, Stewart Hartshorn.

Robert Douglas Hawkins

Robert Douglas Hawkins was born on May 22, 1873, at Lafayette, Ind. He received a B.M.E. degree from Purdue University in 1893 and taught woodworking and mechanical drawing there the following year while working for an M.E. degree. During the next two years he was professor of mechanical engineering and instructor in woodworking and foundry practice at Tulane University, New Orleans, La.

Prior to entering railroad service in August, 1899, he learned the machinist's trade in contract shops, and conducted a business of his own in general drawing and design.

In 1899 Mr. Hawkins became chief draftsman for the Great Northern Railway with headquarters at St. Paul, Minn., and was promoted through the posi-

tions of mechanical engineer, general master mechanic, and assistant superintendent of motive power, to the office of superintendent of motive power for the entire system, which he held from 1910 to 1917. At that time he entered the U. S. Army as Lieutenant-Colonel and was sent to Russia for railway engineering work. While there he was assigned command of the Mechanical Section of the Railway Engineers under Colonel George H. Emerson. He was relieved from service early in 1920 and again entered the employment of the Great Northern Railway in the President's office at St. Paul, Minn., being assigned to special work in connection with mechanical matters.

Later in 1920, Mr. Hawkins became associated with the Atlantic Coast Line Railway, Wilmington, N. C., as general superintendent of motive power, and continued in this capacity until his death in a Baltimore hospital on August 7, 1929, as the result of a stroke suffered on July 28.

Mr. Hawkins is survived by his widow, Mrs. Helen Berkey Hawkins, two sons, R. W. Hawkins of Moorhead, Minn., and W. H. Hawkins of Lakeland, Fla., and one daughter, Mrs. C. S. Gydesen, of Colorado Springs, Colo. He had been a member of the A.S.M.E. since 1918.

H. Wade Hibbard

H. Wade Hibbard, professor of mechanical engineering at the University of Missouri for nearly twenty years, died at the University Hospital in Columbia on May 25, 1929.

Professor Hibbard was born in Maulmain, Burma, India, on September 10, 1863, the son of the Reverend Charles and Susan Ann (Robinson) Hibbard. He prepared for college at Vermont Academy, Saxtons River, Vermont, and was graduated from Brown University in 1886 with an A. B. degree. After spending three years as an apprentice in the machine and erecting shops of the Rhode Island Locomotive Works at Providence, during which time he took evening courses in mechanical drawing, he entered the Sibley College of Engineering at Cornell University. He was awarded the first Sibley Prize in 1890 and in the following year received the degree of M.E. Brown University conferred an honorary A.M. degree upon him in 1899.

After completing his work at Cornell Professor Hibbard spent three years in the Altoona office of the Pennsylvania Railroad as draftsman and mechanical engineer. He then accepted a position as chief draftsman with the Lehigh Valley Railroad, at Easton, Pa.

Professor Hibbard began his teaching career in 1895 as assistant professor of machine design and locomotive engineering at the University of Minnesota. Three years later he became professor of railway mechanical engineering and principal of the Graduate School of Railway Mechanical Engineering of Cornell University, where he remained until 1909. From that time until his death, except for a leave of absence in 1915, when he served as juror of awards in the department of mechanical engineering at the Panama-Pacific Exposition at San Francisco, he had been on the faculty of the University of Missouri. In his contact with his students Professor Hibbard strove to keep before them the highest ideals of the engineering profession and at the same time urged them to broaden themselves by interest in and knowledge of music, art, and the humanities in general. He greatly encouraged independent thinking on their part and free discussion in his classrooms.

As a consulting engineer, particularly in railway engineering, Professor Hibbard was also well known. His work in this field extended to many parts of this country, and took him abroad in the summers of 1892 and 1900. He served as consulting engineer on the president's staff of the Wabash Railroad, made locomotive tests for the Soo lines, and was engaged by many other railroads and companies as production, efficiency, and organizing engineer. He conducted tests on boiler operation in stationary boiler plants, designed an experimental machine and made tests with it to determine the life of boiler staybolts under working conditions, designed and tested airplane propellers, and directed a great deal of other research work. He was recognized as an authority on railway fuels and served as adviser to lawyers or as an expert witness in many legal cases.

His wide experience led to his selection as engineering expert for the New York State Civil Service Commission on several occasions and to his appointment as United States district engineer in the conservation of power plant fuel in Missouri during the World War. He also assisted the Council of National Defense and the Engineers Corps in organization work during the War.

Among his publications were treatises on locomotive grates, the graphical study of information, engineering periodicals and the card index, handling of men, organization, and various other pamphlets on engineering education, scientific management, and research.

Professor Hibbard, who greatly enjoyed mountain climbing, camping, fishing, and similar forms of out-door life, gave his hearty support to the Boy Scout movement, and had served on the Columbia Council and as camp supervisor. He also supported the Anti-Saloon League, and was an active member of the Presbyterian Church.

Professor Hibbard was president of the Scientific Association of the University faculty in 1912 and 1913, a member of the Council of the Society for the Promotion of Engineering Education for three years, chairman of the Technical Investigation Committee of the American Railway Master Mechanics Association for two years, vice-president of the Northwestern Railway Club, and a member of the Master Car Builders Association, New York and St. Louis Railway Clubs, and Sigma Xi and Tau Beta Pi fraternities. He became a junior member of the A.S.M.E. in 1891 and a full member three years later.

Mrs. Hibbard, formerly Mary Coleman Davis, of Walpole, N. H., whom he married in 1896, and four children, Mrs. Alfred S. Romer, Hope, Harlan Davis, and Jeanne Hibbard, survive him.

Harry Seymour Hodge

Harry Seymour Hodge, who had been a member of the A.S.M.E. since 1891, died at the home of a nephew in Detroit, Mich., on November 21, 1929.

Mr. Hodge was born in Detroit on April 21, 1856, the son of Samuel F. and Elizabeth C. Hodge. After being graduated from Rensselaer Polytechnic Institute in 1878 he took a position as superintendent of the Lake Superior Iron Works at Houghton, Mich. In 1884 he became president and general manager of Samuel F. Hodge & Co., Inc., Detroit, now The Great Lakes Engineering Works, and retained this connection for nearly twenty years. In 1892 he was made vice-president and in 1909 president of the Detroit Twist Drill Company. He retired from active business in 1910.

During the last fifteen years of his life, with the exception of a few months prior to his death, Mr. Hodge lived on a small estate at Charlottesville, Va., where he enjoyed his dogs and grew roses and shrubs. He had married twice, but both his wives, as well as a daughter, had predeceased him.

Mr. Hodge also belonged to the American Society of Civil Engineers.

Fred Dean Holdsworth

Fred Dean Holdsworth, former mechanical engineer of the Sullivan Machinery Company and a prominent factor in its growth and development, died on November 20, 1929, at Ashburnham, Mass. He was on the way to his home in Claremont, N. H., from the Peter Bent Brigham hospital at Boston, where he had been undergoing treatment.

Mr. Holdsworth was born at Wales, Mass., on October 23, 1867, only child of Samuel Dean Holdsworth and Emeline Eager Holdsworth. The family moved to Warren, Mass., soon after his birth, and the son secured his preparatory education there. He was graduated from Worcester Polytechnic Institute in 1888, and was connected with the Rhode Island Locomotive Works for a period of two years. He then returned to Warren for seven years as a draftsman with the G. F. Blake Company, later known as Blake & Knowles, and upon the removal of that company to Cambridge, Mass., was made superintendent of the erecting department.

In 1900 Mr. Holdsworth took a position with the Sullivan Machinery Company at Claremont, N. H., where he had been continuously employed until

his retirement in 1928. He organized and developed the Sullivan air compressors, which have reached a wide sale and use, and in his work with the Sullivan company as mechanical engineer he had been awarded nearly fifty patents in the development of their various machines.

He was deeply interested in civic affairs, being a former member of the Rotary Club, of the Claremont Chamber of Commerce, and of the School Board. He had been a member of the A.S.M.E. since 1904, and served as secretary of its Green Mountain Local Section for one year. He was also a member of the Masonic fraternity.

Surviving him are his wife, Lorena (Peebles) Holdsworth, whom he married in 1899; a son, Edward, of Boston; and a daughter, Mrs. Dorothy Holdsworth Turner, of Orange, N. J.

Herman Hollerith

Herman Hollerith, statistical engineer and inventor of the electric tabulating machine now in use by the United States Government for computing census returns, died on November 17, 1929, at his home in Washington, D. C.

Mr. Hollerith was born in Buffalo, N. Y., on February 29, 1860, the son of George and Franciska (Brunn) Hollerith. He was graduated in 1879 from the School of Mines, Columbia College, with the degree of Engineer of Mines, and in 1880 was special agent in charge of statistics of manufacturers in the taking of the 10th Census.

In 1882 Mr. Hollerith was appointed instructor in the department of mechanical engineering at the Massachusetts Institute of Technology, at the request of Gen. Francis A. Walker, with whom he had worked in the 10th Census. He did not like teaching, however, and at the end of his first year went to St. Louis, Mo., where he spent some time experimenting on railroads with electromagnetically operated air brakes, which were later patented by him. He also secured patents on a method of and apparatus for operating pressure of vacuum brakes, and electropneumatic brakes for railroad trains. Jointly with Samuel G. Metcalf he patented an apparatus for corrugating metal tubing.

The need of mechanical aids to the census tabulation was drawn to his attention by Dr. John Shaw Billings, who was in charge of inquiries concerning vital statistics in the 10th Census. During the years between the completion of the 10th Census and the beginning of the 11th Census, Mr. Hollerith developed a system of tabulation which consists in recording separate statistical items pertaining to the individual by holes or combinations of holes punched in sheets of electrically non-conducting material, and bearing a specific relation to each other and to a standard, and then counting or tallying such statistical items separately or in combination by means of mechanical counters operated by electromagnets, the circuits through which are controlled by the perforated sheets.

The earliest practical utilization of this method and the machinery devised for its application was in the tabulation of mortality statistics of the city of Baltimore, and they were also given early use by the Bureau of Vital Statistics of New Jersey and by the Board of Health of New York, N. Y.

The opportunity to apply the Hollerith system to the census problems for which it was especially devised, those of the population and vital statistics tabulation, was first open at the beginning of the organization for the 11th Census (1890). Following a practical test of the three devices submitted for purposes of compiling the Census, the Hollerith system was selected. Tables were compiled which, on account of their complexity, it would have been impossible to compile by ordinary means within a reasonable time. The importance of the system lay in its ability to count combined facts.

During the progress of the 11th Census certain additional features were developed adapting the general system to the compilation of agricultural, manufacturing, and similar statistics. The earliest application of an automatic-feeding device was in this work. The improvements were invented too late to be used on any extended scale in the 11th Census but were successfully used in tabulating the Philippine Census in 1904-1905. In another form the modified and extended system became available for railroad counting and statistics and was first used in the office of the auditor of freight accounts of the N. Y. C. & H. R. R. Co. The system was used in many railway and manufacturing accounting offices and by insurance companies and wholesale and retail distributing establishments.

In addition to the U. S. Census the Hollerith machines have also been used in compiling the Census of Canada, Norway, Austria in 1891, Porto Rico, and Cuba under the personal supervision of Dr. Hollerith; for the only census taken by the Russian Imperial Government, in which upwards of 100 millions of cards were successfully cleared; in France, embracing some 16 million returns; and for the National Registration Act of 1915 in Great Britain and other countries.

Its utility has been demonstrated for compiling records connected with manufacturing costs, cost accounting, life insurance and casualty insurance analyses, railroad accounting, distribution of sales, fire insurance analyses, municipal accounting, sales of service by public service corporations, production statistics, stockkeeping, and state accounting.

Toward the close of the 12th Census the tabulating machine was improved by the addition of automatic feeders, and an automatic sorting machine was also invented. These were used upon the final work of the 12th Census and adopted for routine tabulation and the various requirements of the permanent office, including the tabulation of the Philippine Census in 1904-1905.

The United States Government has issued more than thirty patents to Mr. Hollerith, and he has also secured patents in Austria, Belgium, Canada, France, Germany, Great Britain, Italy, and Russia.

In 1896 the Tabulating Machine Company was incorporated in the State of New York to manufacture machines and to sell cards to the renters of the machines. Dr. Hollerith was general manager and controlled a majority of the stock of the company until 1911, when Charles R. Flint consolidated the Tabulating Machine Company with the Computing Scale Company of America and the International Time Recording Company of New York to form the Computing-Tabulating-Recording Company, afterwards listed on the stock exchanges as the International Business Machines Corporation. Dr. Hollerith was retained as consulting engineer from 1911 until 1921, and served as director until 1914 of the Tabulating Machine Company.

Dr. Hollerith was given an honorary degree of Doctor of Philosophy by Columbia College in 1890, and in the same year was awarded the Elliott Cresson Medal of the Franklin Institute of Philadelphia for his electric tabulating device. He received the Medaille D'Or, Exposition Universelle of 1889, and the Bronze Medal, World's Columbian Exposition, 1892. He was a Founder Member of the A.S.M.E., and belonged also to the Society of Naval Architects and Marine Engineers, the Tau Beta Pi fraternity, the Royal Statistical Society, the American Institute of Weights and Measures, and a number of clubs.

He was married in 1890 in Washington, D. C., to Lucia Beverly Talcott, and is survived by her and six children.

Charles Edwin Holmes

Charles Edwin Holmes, whose death occurred on May 12, 1929, was born at Somerville, Mass., on April 28, 1891, the son of Charles A. and Mary Ellen Holmes. He attended Harvard University, which conferred an S. B. degree upon him in 1913. During the next three years he worked successively as chief engineer in charge of a topographical survey and deed plan for the town of Hopedale, Mass.; on architectural drafting and reinforced-concrete design for Monks & Johnson Co., Boston, Mass.; map draftsman with the P. C. C. & St. Louis R. R. in the valuation department at Pittsburgh, Pa., and as maintenance engineer for the American Steel Foundries, Sharon, Pa.

From 1916 to 1919 Mr. Holmes was connected with the Sharon Steel Hoop Company, engaged in mechanical and structural design, pattern checking, foundation and construction work, and during the third year was entirely responsible for much of this work. He then spent five years with the Youngstown Pressed Steel Company, being chief engineer in charge of design and construction of a new plant at Warren, Ohio, during the first two years, and then becoming plant engineer. In 1924 he resigned this position to handle cost reduction work for the Trumbull Steel Company of Warren. This company merged with the Republic Iron & Steel Co., in 1928, and from then until his death Mr. Holmes was engaged in order cost works for that company.

Mr. Holmes became a member of the A.S.M.E. in 1927. He is survived by his widow, Marion (Seley) Holmes, whom he married in 1922.

Alexander Lewis Jenkins

Alexander Lewis Jenkins, head of the mechanical engineering department of the College of Engineering and Commerce, University of Cincinnati, died on March 8, 1929, after an illness of nearly a year.

Professor Jenkins was born near Springfield, Ky., in January, 1881, the son of John T. and Annie Duncan Jenkins. He attended the Kentucky State University, from which he received the degree of B.M.E. in 1904, and did post-graduate work at the University of Cincinnati, where he received his M.Sc. in 1907, and at Columbia University.

His early technical experience was obtained at the electric light plant at Pikeville, Ky., and electric light and pumping station at Jackson, Tenn. His long association with the University of Cincinnati began when he became instructor in mechanical engineering there in 1905. Three years later he was appointed assistant professor, in 1911 associate professor, and in 1918 head of the department and professor of mechanical engineering. He devoted much of his time and ability to the development of methods of teaching and courses of instruction in mechanical engineering which were especially adapted to the cooperative plan of engineering education offered by the university. He was among the first in this country to develop courses of instruction in the graphical representation of mathematical relations used in engineering computation, and his work on slide rules, graphical charts, and empirical formulas has been highly commended by engineers, educators, and the many students who have taken his lectures.

With the exception of one year, in 1924-1925, when he was granted leave of absence to serve as exchange professor at Robert College, in Constantinople, Professor Jenkins was continuously associated with the University of Cincinnati for twenty-four years.

Professor Jenkins was internationally known for his work in the design of heavy machinery and in research on machine tools, which he began in the summer of 1906 as designer for the Hydraulic Press Manufacturing Company, of Mt. Gilead, Ohio. He was the first to develop and publish an accurate method, based on experimental data, for the determination of the stress distribution in pressed and shrunk fits such as are used in the assembly of large crankshafts, car wheels, locomotive tires, and crossheads. His researches on the rational determination of speeds, feeds, and proportions of machine elements has done much toward substituting exact and scientific knowledge for "rule-of-thumb" methods in the design and construction and operation of many types of machines. His publications on the analysis of combined stresses and their application to the practical design of machine tools, hydraulic presses, punching and shearing machinery are widely quoted in textbooks and engineering literature.

Professor Jenkins became a junior member of the A.S.M.E. in 1907 and was promoted to full membership in 1913. He had served as both secretary and chairman of the Cincinnati Section. He also belonged to the Society for the Promotion of Engineering Education, was director of the Cincinnati Automobile Club from 1922 to 1926, was president of the Engineers' Club of Cincinnati at the time of his death, and held the rank of Major in the Engineers Reserve Corps and was a member of the board of directors of the Cincinnati Post of the Army Ordnance Association. He was a keen patron of sports and encouraged his students to participate in all collegiate contests. He served as a faculty member of the Athletic Council.

His widow, Lydia Duncan Jenkins, whom he married in 1907, and one daughter, Marianna Duncan Jenkins, a student at Bryn Mawr, survive him.

Sherwood Frank Jeter

Sherwood Frank Jeter, vice-president of the Hartford Steam Boiler Inspection and Insurance Company, died suddenly on December 31, 1929, at the Hartford (Conn.) hospital following an operation from which he had apparently been recovering.

Mr. Jeter was born in Columbus, Ga., December 5, 1872, the son of Francis Marion Jeter and Julia Lindsay.

He was graduated from the Georgia School of Technology, Atlanta, Ga., in 1893 with the degree of B.S. in mechanical engineering. He then entered the electrical engineering field in lighting, power, and street-railway work, and spent a year in Mexico City as an electrician for the Mexican Telephone Company.

In 1898 Mr. Jeter became a boiler inspector for the New Orleans department of the Hartford Steam Boiler Inspection and Insurance Company. He remained with this company in its New Orleans, Pittsburgh, and Hartford offices until 1906, with the exception of nine months when he reentered the street-railway field as master mechanic of the Pittsburgh, McKeesport, and Connellsville Railway Company at Connellsville, Pa.

In 1906 he became mechanical engineer for the Bigelow Company, manufacturers of boilers at New Haven, Conn. While with this company he redesigned the Hornsby water-tube boiler to meet the manufacturing and operating conditions in the United States.

During the latter part of 1910 Mr. Jeter returned to the Hartford Steam Boiler Inspection and Insurance Company as supervising inspector. In 1915 he was made chief engineer, and in 1927 he took over all of the company's engineering activities as vice-president.

Mr. Jeter joined the A.S.M.E. in 1909 and had been active in the work of the Boiler Code Committee since 1913, being a member of that committee and of its executive committee. In 1917 he undertook the organization of the Hartford Branch of the Connecticut State Section, now the Hartford Local Section of the Society, and served as its chairman in 1920 and 1921. He was a manager of the Society from 1921 to 1924, and vice-president from 1924 to 1926.

Mr. Jeter married Alice Gamard, on August 29, 1900, who survives him, as do his five children, Mrs. Frank E. Wolcott, Sherwood Frank, Jr., Helen, Alfred, and Lindsay.

Ernest M. Karr

Ernest M. Karr, former chief engineer of Gifford-Wood Company, of Hudson, N. Y., and for a number of years prominent in the civic life of that community, died at his home on March 1, 1929, after an illness of two years.

The son of Philip M. and Ella C. (Pierson) Karr, Ernest Karr was born on February 19, 1880, at Delaware, Ohio, where he passed his early life. He attended the Case School of Applied Science, from which he received the degree of B.S. in 1902 and M.E. four years later. During his summer vacations from June, 1902, to November, 1904, he served as special apprentice with the L. S. & M. S. Railway. Then he went to Watertown, N. Y., as assistant engineer with the New York Air Brake Company, with which he remained until 1908. He was engaged in the design and tests of new equipment and spent fifteen months on special work in the foundry, as assistant to the foundry superintendent. During the next five years, Mr. Karr held the position of designing draftsman with the Bagley & Sewall Co. of Watertown.

In 1913 Mr. Karr went to Hudson and joined the engineering forces of the Gifford-Wood Company. He had resigned the position of chief engineer of the company, and gone back to northern New York for a vacation when he became ill.

During his residence in Hudson, Mr. Karr evidenced a deep interest in its welfare and gave liberally of his time and ability to its advancement. He was chairman of the Charter Revision Committee which conducted a thorough study of the city government and as a result drafted and sponsored the present city charter. He also served the city as a member of the Board of Aldermen, and was a member of the Common Council for several terms. He served as chairman of a special committee to study the city water system, and compiled a most accurate and thorough report concerning the system. He also sponsored other public improvements.

Mr. Karr was a member of the official board of the First Methodist Church of Hudson, and active in Masonry there. He became a junior member of the

A.S.M.E. in 1905 and was promoted to full membership in 1913. He represented the Society on the Joint Committee on Transmission Chains and Sprockets.

Mr. Karr was a deep student of literature, liking especially biography and history in all its forms and concerning all periods. He also enjoyed fishing and outdoor life.

Mr. Karr is survived by his widow, formerly Miss Lucy May Halladay, whom he married in 1908, and by one daughter, Marion Louise Karr.

Alfred Gilmore Kelley

Alfred Gilmore Kelley was born at Hyde Park, Mass., on October 15, 1876, and died suddenly at his home in Los Angeles, Calif., on January 26, 1929. He was the son of Charles and Margaret (Kehoe) Kelley.

During his childhood he spent some years on board ship touring the world, with a private tutor, after which he attended high school in Boston and studied for three years at the Massachusetts Institute of Technology. His first position was with the Hyde Park Electric Company, with which he was connected from 1900 to 1902, the latter part of the time as chief engineer of the power plant. As erecting engineer for the Brown Corliss Engine Company he was located first at Pawtucket, R. I., and then sent to Cape Town, South Africa. The failure of the company caused him to return to the United States, where he became erecting engineer for the Allis-Chalmers Manufacturing Company, of Milwaukee, Wis. In 1904 he accepted a similar position with the Jones Underfeed Stoker Company, of Chicago, Ill., with which he was connected for the next five years. He installed stoker equipment for the company in Canton, Ohio, Chilhuahua, Mexico, Tokio, Japan, and Buenos Aires, South America. He then returned to the States and was detailed to the plant of the Northwestern Malleable Iron Company at Milwaukee to conduct a series of experiments on the use of mechanical stokers for annealing cast iron.

In 1909 Mr. Kelley became associated with J. F. Connell, consulting engineer of Los Angeles, Calif., with whom he remained for four years, designing and installing power plants in various office buildings. The next four years were spent installing equipment for the Consolidated Arizona Copper Company, United Verde Copper Company, and New Cornelia Copper Company.

During the World War Mr. Kelley served for two years as maintenance engineer for the Los Angeles Shipbuilding & Drydock Corpn., under Governmental supervision. In 1918 he was transferred to Las Vegas, Nev., to act as general roundhouse foreman on the Salt Lake Railroad, under the U. S. Railroad Administration.

In 1920, after a short period as master mechanic for the Goodyear Tire & Rubber Co., at Los Angeles, he went to Tampico, Mexico, to build a small power plant for the Continental Mexican Petroleum Company, following which he constructed a pipe line and pumping stations for the Foundation Company, of Vera Cruz.

After two years in Mexico Mr. Kelley returned to Los Angeles where, for five years, he acted as superintendent of construction for the Los Angeles Gas & Elec. Corpn., having charge of the erection of a large gas plant, gas holders, compressor stations, electric sub-stations, etc. In the year which followed the completion of this task he served as superintendent of construction for the Los Angeles Bureau of Power & Light, erecting foundations for high-tension power lines, and building a hydroelectric power plant at Haiwee, Calif.

Since the latter part of 1927, when this work was completed, his health, which had been failing for some time, had prevented him from undertaking any other large project.

Mr. Kelley became an associate member of the A.S.M.E. in 1923, and was promoted to full membership in 1926. He belonged to the Engineers Club of Southern California and the Masonic fraternity, in which he was a Shriner. He is survived by his widow, Emma Jean Pelletier Ser-Vis Kelley, whom he married in 1920.

Frank E. Kirby

Frank E. Kirby, marine architect and consulting engineer, died in Bronxville, N. Y., on August 25, 1929, at the age of eighty. Mr. Kirby was the designer of several of the best known vessels on the Hudson River, including the *Hendrick Hudson, Washington Irving,* and *DeWitt Clinton.* He was in charge of the reproduction of the *Clermont,* Robert Fulton's first steamship, for the state of New York, on the one hundredth anniversary of the original *Clermont.*

Mr. Kirby was born on July 1, 1849, near Cleveland, Ohio, the son of Stephen R. and Martha A. (Johnston) Kirby. He attended the public schools of Cleveland and Saginaw, Michigan, and in 1864 went to New York, where he studied at Cooper Institute. His first position was on the staff of the Allaire Works of New York, makers of marine engines, and later he was connected with the Morgan Iron Works. About 1870 he returned to Michigan where he was associated with his brother in the construction of the iron shipyards at Wyandotte, the first permanent plant on the Great Lakes for the building of iron and steel vessels.

In association with his brother until 1882 and subsequently with the Detroit Dry Dock Company Mr. Kirby designed more than two hundred steamships for service on the Great Lakes, including two ice-crushing steamers and all the boats of the Detroit & Cleveland Navigation Company.

Mr. Kirby was consulting engineer for the *Bergen,* the first double-ended screw propellor ferryboat for the New York harbor. Ferryboats of his design are in service all over the world. His profession took him to Japan, China, South America, Europe, and other foreign countries.

During the World War Mr. Kirby was consulting engineer for the Submarine Boat Corporation of Newark, N. J., and passed alternate weeks in Detroit assisting Henry Ford in the building of Eagle boats for anti-submarine service.

Mr. Kirby was a member of the Detroit Water Works Commission from 1892 to 1896, and expert for the U. S. Government in the selection of ships for transport service during the Spanish-American War. He belonged to the Institution of Naval Architects, London; Institution of Naval Architects and Engineers, Scotland; American Society of Naval Architects and Marine Engineers; and a number of other organizations, including clubs in New York and Detroit. He was a Life Member of the A.S.M.E., having joined the Society in 1880. He served as a member of the Nominating Committee in 1907.

Mr. Kirby married Mary F. Thorp, of Wyandotte, Mich., in 1876, and is survived by her and one son, Russell T. Kirby.

August Henry Klotz

August Henry Klotz was born at Sandusky, Ohio, on November 1, 1863, the son of G. August and Sophia Miller Klotz, and died on January 7, 1929, after an illness of several months. He received his early education in the Sandusky schools and was graduated from the high school there. Later he attended Rose Polytechnic Institute, Terre Haute, Ind., from which he was graduated in 1893 with an M. E. degree.

Following his graduation Mr. Klotz returned to the Klotz & Kromer Machine Co., with which his father was associated and where he had served an apprenticeship as machinist before entering Rose Polytechnic Institute. He specialized in wire-forming machinery, as consulting and designing engineer, and during this period came in contact with a number of machine shops in the southern and western states, thus greatly broadening his experience.

From 1894 to 1900 Mr. Klotz was associated with Geo. Feick & Co., architects and contractors, as accountant and consulting engineer. He then purchased the business of the Klotz & Kromer Machine Co., and operated it continuously, under the name of Klotz Machine Company, until the time of his death. During this time he designed and built woodworking, paper box, wire-forming, and other special automatic machinery, and acted as consulting engineer in various departments connected with the City of Sandusky.

Mr. Klotz was a member of the Board of Directors of the Citizens Banking Company, and a director and consulting engineer of the Paper & Textile Machinery Co. He was a 32d degree Mason and was connected with many branches of the fraternity. He had been a member of the A.S.M.E. since 1921, and belonged also to the Cleveland Engineering Society, the United Commercial Travelers, and several clubs in Sandusky. He always took a keen interest in civic affairs. He read extensively and maintained a valuable library.

His widow, Barbara Biewiller Klotz, whom he married in 1908, survives him.

Oscar W. Knackmuss

Oscar W. Knackmuss, development engineer in the Research Department of the Radio Corporation of America, New York, N. Y., died of septicemia at the Lenox Hill Hospital in New York, on July 31, 1929.

Mr. Knackmuss was born at Frankfort-on-the-Main, Germany, on October 7, 1897, the son of Friedrich and Theresia Peiter Knackmuss. He attended the Ober Realschule and the Technische Hochshule, receiving his M. E. degree from the latter in 1921. He spent a year as designer for Demag, at Duisburg, Germany, and two years as shop engineer for the Neumeyer Company at Nuremberg. For nearly a year he was in charge of the repair shop at the Wolfen plant of the German Dyeing Trust, manufacturing artificial silk and moving picture films.

After several months as shop engineer for Heddernheimer Kupferwerke, at Frankfort, Mr. Knackmuss came to the United States and early in 1926 entered the employ of the Fuller-Lehigh Co., at Fullerton, Pa., as designer of water-cooled walls for furnaces. The following year he became mechanical engineer for the Victor Talking Machine Company at Camden, N. J., engaged on work on mechanical filters and the sound-box theory. Later he was appointed assistant to the head of the Apparatus Development Department of the company, with which he remained until April 15, 1929.

After a trip abroad, during which he visited various research institutions, Mr. Knackmuss returned to the United States on July 1, accept the position which he held at the time of his death.

Mr. Knackmuss was co-author with R. F. Mallina of a paper on the "Vector Presentation of Broad-Band Wave Filters," presented before the American Institute of Electrical Engineers early in 1929. He became an associate-member of the A.S.M.E. in 1928 and also belonged to the Verein deutscher Ingenieure. He is survived by his widow, Anne Abt Knackmuss, whom he married on June 9, 1929.

Henry Marcus Lane

Henry Marcus Lane, a member of the Lane & Bodley Co., engine builders of Cincinnati, Ohio, was among those whose death resulted from the explosion of x-ray films at the Cleveland Clinic Hospital on May 15, 1929. He had been taken ill while visiting his daughter, Mrs. John T. Wood, of Cleveland, and was taken to the hospital for treatment a short time before the disaster. His wife was also a patient at the hospital but was in another part of the building and escaped injury.

Mr. Lane was born in Cincinnati on August 15, 1854, the son of Philander Parmelee and Sophia Rebecca (Bosworth) Lane. He received his elementary education in Cincinnati and then attended the Massachusetts Institute of Technology, completing special work there in 1873. He then entered the drawing room of the Lane & Bodley Co., which was founded by his father, and about 1875 took charge of the engineering department of the company.

His first work of note was the design of the power equipment and winding machinery for the Elm Street Inclined Plane Railway (popularly called the Bellevue inclined plane), which was the most complete inclined plane for passengers in the United States. This railway has been dismantled and removed.

In 1879 he supervised the reconstruction of the Mt. Adams Inclined Plane Railway, sometimes called the Eden Park inclined plane, so that it could handle horse cars as well as passengers. This railway is still in daily use.

From 1880 to 1884 he devoted the most of his time to the improvement of the various types of steam, hydraulic, and woodworking machinery produced by the Lane & Bodley Co.

In 1884 he opened an independent office as a mechanical engineer, and made careful investigations of the early cable roads built in San Francisco, as a result of which he was employed to design and construct Cincinnati's first cable railway, the Gilbert Avenue (or Walnut Hills) Cable Road; he was granted many patents upon the special details of construction used. The first cast-iron cable conduit yokes were used on this job and later adopted as the standard type of construction for cable and conduit-electric roads throughout the country. The Walnut Hills Cable Road was placed in operation in 1886 and extended to East Walnut Hills and to Government Square in 1887. During the next year or two Mr. Lane designed and constructed the Vine Street Cable Road, on lines similar to those for the Walnut Hills Road.

His next important work was the design and construction of a Cable Railway in Denver, Colo., the first in that state. It was a narrow-gage cable road with many special features, the driving machinery being constructed with multiple-rope drive between engines and cable drums, in place of the usual gear wheels, which greatly reduced the vibrations, noise, and breakage. After completing this road Mr. Lane designed and constructed a similar one in Providence, R. I., the first in New England.

After the death of his father in 1890 Mr. Lane returned to Cincinnati and became president of the Lane & Bodley Co., retaining this position until he retired from business a few years before his death. Among the lines which Mr. Lane had served as consulting engineer were the St. Louis Cable Railway Company, Western Railway Company, and the St. Paul and Boston Tramway Company.

Mr. Lane was a charter member of the Engineers' Club of Cincinnati, having joined in 1888. He became a member of the A.S.M.E., in 1886; had been a member for many years of the Queen City Club and the Cincinnati Country Club, and was an hereditary member of the Military Order of the Loyal Legion. He was superintendent of the machinery department of the Cincinnati Industrial Exposition in 1881, and was chairman of the mechanics and engineering section of Ohio Mechanics Institute in 1883 and 1884. He had contributed a number of papers and discussions on foundry practice, the relation of cost to selling price, and other subjects to the societies to which he belonged and to the technical press. He had travelled in this and other countries a great deal, and acquired a wide knowledge of engineering methods.

His widow was formerly Blanche A. Conkling, of Avondale, Cincinnati. They were married in 1903.

Horace H. Lane

Horace H. Lane, whose death occurred on August 20, 1929, was born at Huntingdon, Pa. on May 25, 1860. Following his high school instruction he served an apprenticeship as a machinist with the Cambria Iron Works in Johnstown, Pa. After working in several shops, staying from two to six months in a place, he had an opportunity to buy an interest in a machine shop at Huntingdon, Pa., and operated it for twelve years. He then sold the shop and went to New York, N. Y., where he became connected with Westinghouse, Church, Kerr, and Company.

During the ten years he remained with the company Mr. Lane handled the construction of the Pittsburgh and Lake Erie Passenger Terminal at Pittsburgh, Pa., and plants of the American Car and Foundry Company in Detroit, Mich., and Berwick, Pa. Each of these jobs had a complete power plant along with the other departments. He also supervised the construction of the Detroit Edison plant at Delray, Mich., and did work in connection with minor jobs in various parts of the country.

In 1907 Mr. Lane opened his own office in Detroit as consulting engineer, where he designed and constructed two large automobile plants and did work in connection with others. He also designed and constructed a new plant for the Haskell and Barker Car Company at Michigan City, Ind., and took the organization from there to Nova Scotia where he designed and constructed the plant for the Eastern Car Company at New Glasgow. Afterwards he built two

shipyards, one near Quebec and one near Detroit, and acted in a consulting capacity on a number of industrial plants, including a plant at Seattle, Wash., one at Portland, Ore., and one at Birmingham, Ala., as well as a number of power-house jobs in various locations. Some six or seven years before his death he formed the firm of Lane, Davenport and Peterson, Engineers and Architects, with offices in Detroit. He was engaged in active work with this firm until about two years before his death, and subsequently acted only in a consulting capacity.

Mr. Lane became a member of the A.S.M.E. in 1918. He also belonged to the Detroit Engineering Society, of which he was president in 1916 and 1917.

Jared Stout Lapham

Jared Stout Lapham died at Northville, Mich., his birthplace, on November 24, 1929, after a long illness. He was born on April 18, 1886, the son of W. G. and Edith (Stout) Lapham. He attended school in Northville and the Detroit University School, and received an M. E. degree from the University of Virginia in 1911.

After two years assisting his father in the firm of J. S. Lapham & Co., grain merchants of Detroit, and Lapham & Co., cotton manufacturers, Augusta, Ga., he became an instructor in applied mechanics at the University of Virginia, and two years later, in 1915, was made adjunct professor of experimental engineering there. Mr. Lapham served the Government as factory inspector in Michigan during 1918 and 1919. Ill health prevented his return to teaching after the War, and since then he had engaged in mechanical engineering work in Northville.

Mr. Lapham was a member of the American Association for the Advancement of Science and of the A.S.M.E., which he joined in 1916, as well as of several social organizations.

John Pollock Leask

John Pollock Leask died at his home in Glenbrook, Conn., on June 20, 1929, after an illness of more than six months. Mr. Leask was born at Hoboken, N. J., on March 19, 1887. He was graduated from Stevens Institute of Technology in 1910, and entered the employment of the United Gas & Improvement Co. in Philadelphia in the fall of that year. He resigned in 1911 to join the Brooklyn Union Gas Company where he quickly rose to positions of responsibility and gained important experience in the operation and maintenance of boiler plants and power production, as well as in the handling of gas manufacturing machinery. In 1918 he resigned his position to enter the employ of the Gilbert & Barker Co., a subsidiary of the Standard Oil Company of New York, which had taken up the manufacture of oil-burning equipment. In the capacity of sales engineer in this company Mr. Leask became well known in this field.

In 1920 the Gilbert & Barker Co. gave up the manufacture of oil burners and Mr. Leask entered the employ of the then recently formed Petroleum Heat & Power Co. as sales engineer. He resigned his position with that company in September, 1920, to become associated with the Peabody Engineering Corporation. At the time of his death he was a director and vice-president of this company. In this capacity he had a great deal to do with the development of the special equipment manufactured by the company. His close contact with this work caused him to contribute many inventions of value. He also took a conspicuous part in the progressive policy and pioneering engineering work promoted by the company in the field of combustion.

Mr. Leask is survived by his widow, Grace (Hollister) Leask, and by two sons and two daughters.

Mr. Leask became a member of the A.S.M.E. in 1923, and belonged to several clubs, including the Advertising Club of New York.

Wilfred Lewis

Wilfred Lewis, retired president of The Tabor Manufacturing Company, Philadelphia, Pa., and for forty years an expert in gears, died at sea on December 19, 1929. He was returning from the World Engineering Congress at Tokyo and was buried at sea near Egypt from the steamship *President Wilson.* Mrs. Lewis was traveling with him.

Wilfred Lewis was born in Philadelphia, Pa., October 16, 1854. He was the son of Edward and Elizabeth I. Lewis. His education was received at the Friends' Central School, Philadelphia, and at the Massachusetts Institute of Technology, from which he was graduated in 1875 with the degree of B.S. in mechanical engineering.

Serving as a mechanic from 1875 to 1878, and as a draftsman from 1879 to 1882, he became successively designer, assistant engineer, and director of William Sellers and Company, Philadelphia, from 1883 to 1900. In 1900 he was made president of The Tabor Manufacturing Company, in Philadelphia, a position which he held until his retirement from active service about a year before his death.

Mr. Lewis was a productive inventor. He was an expert in the design, construction, and testing of gears. His interest in this subject, which began when he was employed by William Sellers and Company, brought forth a paper on "Experiments on the Transmission of Power by Gearing," published in the Society's Transactions in 1886. Later, in 1910, at a joint meeting of the A.S.M.E. and the I.M.E. held in Birmingham, England, he described the first machine he had built to determine the friction loss of gears under various speeds and pressures. This machine was set up and run at the Massachusetts Institute of Technology. In the Transactions of 1918, in discussing a paper on the efficiency of gear drives, he described his second machine, built for use at the University of Illinois. His third machine, described in the December, 1922, issue of *Mechanical Engineering,* was built for the Special Research Committee on the Strength of Gear Teeth, of which he was chairman, and is being used by the committee at the Massachusetts Institute of Technology in the investigation it is carrying on to determine the effect of tooth accuracy on the strength of gear teeth at varying velocities.

Because of his valuable contributions to engineering in the field of gearing, Mr. Lewis was awarded the A.S.M.E. Medal in 1927. In presenting him as the recipient of the award, Conrad N. Lauer said:

"This man is a world authority on gears. His formula, the universal guide in gear design, is the result of abstract analysis rather than of elaborate experimental tests. He was the first specialist to eliminate the rule of thumb in gear design and to place it on a sound engineering basis."

During the war Mr. Lewis served at Washington as an adviser in the development of fighting tanks.

Mr. Lewis joined The American Society of Mechanical Engineers in 1884. He was a life member of the Society, and served as vice-president from 1901 to 1903. He was a member of The Franklin Institute, and in 1927 received its Longstreth Medal for perfecting a molding machine.

He was a member of the Philadelphia Art Club, the Merion Cricket Club, the Engineers' Clubs of Philadelphia and New York, and the Historical Society of Pennsylvania.

On January 16, 1895, Mr. Lewis married Emily Sargent, who, with his sons Leicester and Wilfred S. Lewis, and a daughter. Mrs. Horace Pettit, Jr., survives him.

John William Lieb

John William Lieb, Past Vice-President of The American Society of Mechanical Engineers, 1906-1908, Senior Vice-President of the New York Edison Company, and an engineer and executive of international reputation, died at his home at Beechmont, New Rochelle, N. Y., on Friday, November 1, 1929, following an illness which had confined him to his bed for about six weeks.

Dr. Lieb was born in Newark, New Jersey, on February 12, 1860. He was the son of John William and Christina Zens Lieb, who had immigrated from

Wurtemburg and entered into the life of the thriving New Jersey city. His early education was obtained in the local public schools and the Newark Academy, following which he entered the Stevens High School at Hoboken, New Jersey. After being graduated from this school in 1876 he entered the Stevens Institute of Technology, from which he was graduated in 1880, receiving the degree of Mechanical Engineer.

His mind had early turned toward the new discoveries which at that time were being made public along electrical lines, and shortly after his graduation he entered the employ of the Brush Electric Company in Cleveland, Ohio, where he worked on the arc-light system as a draftsman. He soon saw that the arc-light system had about reached the limit of its development, and after a few months, in January, 1881, he entered the employ of Thomas A. Edison, of the new Edison Electric Light Company, as draftsman in the Engineering Department, at 65 Fifth Avenue, New York. Here he assisted in making the plans for the "Jumbo" dynamos and in the design of the switches, regulating apparatus, and other electrical equipment for the new Pearl Street Station in New York, which was to be the first central station in the world for the general distribution of electrical energy for utilization as light, heat, and power from an underground system of mains. Later in the year he was transferred to Mr. Edison's experimental and testing department at the Edison Machine Works, Goerck Street, New York, where he became engaged in researches and investigations on electric meters, regulators and electrical apparatus, under the personal direction of Mr. Edison. Early in 1882 he was assigned to the construction of the Pearl Street Station, in general charge of the planning and installation of the electrical equipment. When this station was put into regular operation on September 4, 1882, under the auspices of the Edison Electric Illuminating Company of New York, he was given the appointment of electrician in charge of the electrical equipment. It is a curious fact that the term "electrical engineer" apparently had not at that time been invented, and this title of "electrician was probably the first central-station title pertaining to the electric industry.

These new responsibilities Dr. Lieb filled for only a short period, since in November of the same year he was selected by Mr. Edison to proceed to Milan, Italy, to direct the design and installation of the first Milan Edison Station, in the old Via di Santa Radegonda.

On the organization of the Società Generale Italiana di Electricità, Sistema Edison, he was appointed its chief electrician, then chief engineer, and finally technical manager and director of stations. The Milan station, which was started in regular service in March, 1883, was for a considerable time the largest and most successful electric light and power station in Europe. Besides the Edison direct-current system, the Milan company was among the first to install, in 1886-1888, an alternating-current system of distribution utilizing, among the very first applications, the connection of transformers in parallel according to the Zipernowsky, Deri, and Blathy patents, exploited by Ganz & Company of Budapest. Here was also done pioneer work in the transmission of high-tension alternating current at 2400 volts, through concentric underground cables, to consumers located several miles from the central station. Under Dr. Lieb's direction, there was undertaken in Milan some of the first experiments in operating large direct-driven alternators in parallel.

The Thomson-Houston series arc system, with arc-light machines supplying 50 lamps in series, received here one of the earliest applications in Europe, and was extended later throughout the whole city from a separate arc-light station. The earlier arc-light poles had always been offensive to his esthetic sense, and he inaugurated the use of artistically designed poles which were much more pleasing to the eye. In 1893 there was put into regular service, under Dr. Lieb's direction, in Milan, one of the earliest trolley systems in Italy, furnishing regular service from the Piazza del Duomo to outlying districts.

In the meanwhile he had returned to New York to be married to Miss Minnie F. Engler on July 29, 1886, taking her back with him to Milan where he continued his work in popularizing and extending the use of electric light, heat, and power. It was during this visit to America that Mr. Lieb joined The American Society of Mechanical Engineers. In his connection with the Italian Edison Company, he acted as adviser for many financial and industrial corporations engaged in the electric business where his active and enthusiastic

mind, united with the judgment of a manager and executive, assured sound methods in the exploiting and extension of the electric industry. Already the possessor of two languages, German and English, from early life, he had become master of Italian and French, even speaking the local dialects with considerable ease.

For his pioneer work in connection with the introduction of electric-light and power service throughout Italy and the installation of the electric trolley system in Milan, he was decorated by the Italian Government, Knight Commander of the Royal Order of the Crown of Italy, and later promoted to Grand Officer. In 1925 he was made "Ufficiale" of the Order of S. S. Maurizio e Lazzaro, and in 1928 was honored by the French Government, receiving the decoration of Officer of the Legion of Honor.

In 1894, Dr. Lieb returned to America, becoming assistant to R. R. Bowker, then vice-president and executive of the Edison Electric Illuminating Company of New York. The next four years were most fruitful in the development of the use of electric light and power in the city of New York, and Dr. Lieb made three visits to Europe in connection with other officials of the company preliminary to the design and construction of the Waterside Station and the adoption of high-tension alternating-current generation with rotary converters and low-tension direct-current substations for the Edison system. These years also saw the first storage battery installed on the Edison System. On January 1, 1898, the control of the company passed into the hands of A. N. Brady, with T. E. Murray as vice-president. At this time Dr. Lieb became third vice-president and general manager, serving in this capacity until the company's reorganization as the New York Edison Company in 1901. In the reorganized company he became associate general manager, vice-president, and general manager, and finally senior vice-president, which office he held at his demise. During this period he had general charge of the installation and operation of the power plants and distributing systems in New York, and was the executive in charge of the company's technical operations, with supervision over all technical research and development work.

Dr. Lieb was senior vice-president and a director of the New York Edison Company; president and chairman of the board of The Electrical Testing Laboratories; vice-president and member of the board of directors of the Yonkers Electric Light and Power Company; member of the board of directors of the United Electric Light and Power Company, and of the New York and Queens Electric Light and Power Company; vice-president of the Edison Electric Light and Power Installation Company; director and member of the executive committee of the International Power Securities Corporation; and director of the Brush Electric Illuminating Company, the Empire City Subway Company, and the Consolidated Telegraph and Electrical Subway Company.

Dr. Lieb was a past-president and fellow of the American Institute of Electrical Engineers; past-president of the Association of Edison Illuminating Companies, National Electric Light Association, the New York Electrical Society, and the Edison Pioneers; past vice-president of The American Society of Mechanical Engineers; fellow of the New York Academy of Sciences; trustee of the Stevens Institute of Technology; trustee and vice-president of The Museums of the Peaceful Arts; trustee of the Italy-America Society; and member of the American Society of Civil Engineers, Illuminating Engineering Society, Franklin Institute of Philadelphia, American Association for the Advancement of Science, and of numerous other professional and civic organizations, national and local. He was an honorary member of the Society of Italian Engineers and Architects, and of the Society of Italian Railway Engineers; vice-president of the Union Internationale des Producteurs et Distributeurs d'Energie Electrique; and a member of the Elektrotechnischer Verein, the Associazione Elettrotecnica Italiana, the Institution of Electrical Engineers of Great Britain, the Royal Society of Arts, and the Newcomen Society of London.

He was for many years past the chairman of the Lamp Committee of the Association of Edison Illuminating Companies, and during the war was chairman of the National Committee on Gas and Electric Service, representing in Washington the public-utility companies (gas, electric, and street-railway service) of the country in their cooperative relations with the various departments of the Government. He was a member of the Committee on Public

Utilities of the U. S. Chamber of Commerce, on which he represented the National Electric Light Association as its National Councilor; chairman of the N.E.L.A.. delegation to the International Chamber of Commerce; representative of the N.E.L.A. on the International Association of Producers and Distributors of Electrical Energy; member of the New York Chamber of Commerce and of its Committee on Internal Trade and Improvements; member of The Merchants Association of New York and chairman of its Industrial Committee; member of the National Industrial Conference Board and Chairman of the Joint Fuel Committee representing the National Public Utility Associations; member of the Committee to study plans for cooperation between the War Department and the National Association of Manufacturers; and a member of the Committee on Standardization Survey, the American Society of Military Engineers, and the National Research Council.

He served in international matters as: Chairman, Section E, International Electrical Congress, St. Louis, 1904; representative, U. S. Department of State at International Railroad Congress, Rome, 1922; member, U. S. Executive Committee, World Power Conference, London, 1924; U. S. delegate, International Congress on Illumination, Geneva, 1924; chairman Reception Committee, International Electrotechnical Commission Meeting, New York, 1926; vice-president, International Association of Producers and Distributors of Electrical Energy, Paris, 1928; and executive chairman, American Organization Committee, World Engineering Congress, Tokyo, Japan, 1929.

Dr. Lieb had always been most sympathetic with the youthful aspirant to a position in the engineering profession. He valued highly the training he had received at the Stevens Institute of Technology and maintained a very active interest in engineering education and the progress of his Alma Mater. He served as president of the Alumni Association in 1896 and 1897, and as alumni representative on the Board of Trustees of Stevens Institute from 1908 to 1911. In 1921 he received from his Alma Mater the honorary degree of Doctor of Engineering, and in 1927 became a life member of the Board of Trustees.

He was equally interested in society affairs, becoming a member of The American Society of Mechanical Engineers in 1886, the American Institute of Electrical Engineers in 1887, and the American Society of Civil Engineers in 1898. He was elected manager of the American Institute of Electrical Engineers for the terms 1896-1899 and 1901-1903, vice-president for 1899-1901 and for 1903-1904, and served as president of the Institute in 1904-1905. In 1913 he became a fellow of the same society. He was elected manager of The American Society of Mechanical Engineers for the term 1903-1906, and vice-president for the term 1906-1908. He was greatly interested in the affairs of the United Engineering Society, and particularly of its library, serving on the A.S.M.E. library committee and as a member of the Library Board for some years, part of the time as chairman. Outside these activities he gave freely of his time and advice in the furtherance of the work of these technical societies.

Very early in his career, Dr. Lieb acquired a facility in reading which placed him in a most advantageous position. The ability to read a book which normally would require five or six hours in a mere fraction of that time, was undoubtedly helped by the quickness of his cognitions and his logical and orderly process of thought. His interests widened with every avenue which his reading opened before him. Besides the sciences, the arts, the humanities, and the technical branches allied to his own profession became part of his mental make-up. During his residence in Italy he became a deep student of history and its allied science of archaeology. He became interested in the work of that "universal genius" Leonardo da Vinci, and for many years was engaged in the critical study of his notebooks, investigating and translating sketches and texts covering Leonardo's work, particularly in the fields of natural science and engineering. He became a member of the "Raccolta Vinciana" of Milan, and in the course of years gathered what is probably the largest collection of Vinciana in existence.

Dr. Lieb delivered many lectures on engineering, industrial, and economic subjects in many of the leading universities and technical schools in the United States, and contributed many reports, papers, and discussions to the transactions of professional and learned societies. On February 4, 1924, he

was awarded the Edison Medal by the American Institute of Electrical Engineers for his work in connection with the development and operation of electric central stations for illumination and power.

Light's Golden Jubilee, which was recently celebrated, received its first formal suggestion on Edison's 82nd birthday, February 11, 1929, when at a luncheon of the Edison Pioneers—that gallant body of men who were associated with the great inventor in his pioneering days—their fellow-member, Dr. Lieb, tentatively outlined the celebration and the pioneers approved a resolution authorizing the appointment of a committee to propose to the electrical industry the sponsoring of the celebration.

With the vision of the pioneer, the well-considered knowledge and training of the scientist, and the wide sympathies of the humanitarian, he endeared himself to every one with whom he same in contact. Many people of diverse races, training, and sympathies have said of him, "he talks to us in our own language," and he had the faculty of picking out, as it were, the underlying idea, the main trend, the crux of a situation, and of divesting it of all extraneous matter, going straight to the root of things. His reasoning was never oblique but logical and cogent, sparing none, not even himself, in the strength of his analysis of a situation.

His sympathies were wide, ranging over the entire realm of human activities; his versatility and general knowledge might be termed encyclopedic, to which many specialists in various lines have testified. His English vocabulary was perhaps his most wonderful achievement, and his writings have always been models of clearness and good expression, using the right word in the right place to obtain just the shade of meaning he desired. His wide sympathies were well known, and his office was opened to everybody, while his philanthropic work usually made more demands on his strength than he could well afford.

Dr. Lieb is survived by his wife, who prior to their marriage in 1886 was Miss Minnie F. Engler, two daughters, Misses Minnie E. and Julia C. Lieb, and a son, Adolph W. Lieb. A brother, Oscar J. Lieb, and two sisters, Mrs. Charles Oscar Baldwin and Miss Anna Lieb, also survive.—GEO. A. ORROK.

Bruce Lloyd

Bruce Lloyd was born at Auckland, New Zealand, on March 27, 1865. The son of a prosperous rope manufacture, he early evidenced a trend toward mechanics and engineering. After academic education he was trained at Auckland in marine engineering and had some operating experience at sea under the late William Laird in steamers of the Northern Steamship Company of Auckland.

In 1886 Mr. Lloyd came to the United States and entered the employ of the Union Iron Works, at San Francisco, Calif. That institution was then successfully wrestling with the great problems involved in building modern steel warships 300 miles from the nearest source of raw material. Mr. Lloyd worked on these problems. He helped build the cruisers *Charleston, San Francisco,* and *Olympia,* the famous battleship *Oregon,* and the coast defense vessel *Monterey.* On the *Monterey,* he went out as guarantee engineer, and on this cruise formed many lasting friendships with United States Navy officers.

The Union Iron Works, as a manufacturer of mining machinery, had built up a large business in Australia and New Zealand, and in 1896, Mr. Lloyd was sent out to be its representative in New Zealand. This berth was filled with credit for ten years, during which time Mr. and Mrs. Lloyd made numerous trips between San Francisco and Auckland.

In 1906 he severed this connection and in 1907 entered into partnership in San Francisco with Charles Kerr, and as the firm of Kerr, Lloyd & Co., engaged in marine repairs. This firm, after a useful career, was dissolved in 1915 and Mr. Lloyd became sales manager for Henry Lund & Co., Pacific Coast representative of Bolinder products, which position he held until the death of Henry Lund in 1926.

During 1917 and 1918, Mr. Lloyd's services were requisitioned by the United States Shipping Board, and he was placed in charge of the Board's experiment with concrete ships at Government Island in the Oakland Estuary, Calif.

From 1926 until his death, on May 27, 1929, he was in general engineering consultant work in San Francisco.

Mr. Lloyd was peculiarly fitted for organization work and was a very useful member of A.S.M.E., San Francisco Section, of which he was chairman. He was elected to membership in the Society in 1919. He was a member and past-president of the Engineers Club of San Francisco; member and president of the Pacific Association of Consulting Engineers; member and elder of Trinity Presbyterian Church, San Francisco; and a member of the Commonwealth Club, San Francisco.

In 1894 Mr. Lloyd married Margaret Cull of San Francisco, who survives him.

James Logan

James Logan, mayor of Worcester from 1908 to 1911, vice-president and general manager of the U. S. Envelope Co. for more than twenty-five years, and for many years closely identified with the civic and industrial life of that city, died at his home on December 1, 1929, at the age of seventy-eight. Until within a few years of his death, Mr. Logan had kept good health and maintained an active interest in his work. His death was preceded by that of his wife, Mrs. Annie Devereaux (Johnson) Logan, by less than two months. He is survived by his two daughters, Miss Alice Logan and Mrs. Ruth Taylor Bosworth, and a son, Donald Brigham Logan.

Mr. Logan was born in Glasgow, Scotland, on May 6, 1852, the youngest of four children of David and Mary (Kennedy) Logan. When he was only three months old his parents emigrated to the United States. After a short stay in Connecticut the family moved to Worcester in 1853, and some years later to Cherry Valley, where his father engaged in farming.

At the age of 10 years James Logan started to work in the Parkhurst Woolen Mills at Valley Falls. Aided by a teacher in the Valley Falls school, he spent what time he could in studying. When scarcely 11 years old, his arm was caught in a machine and broken in three places, so badly that it never recovered its full strength and usefulness. In spite of the accident he was able to resume work, but an illness when he was sixteen year old left him able to perform only the lightest of mill tasks. It was because of this that he decided to study bookkeeping.

While attending the B. G. Howe Business College he was employed as billing clerk in the office of S. R. Heywood & Co., boot manufacturers. On completing his course he found temporary employment with the First National Fire Insurance Company. His first permanent position was as bookkeeper for A. Y. Thompson & Co., dry goods dealers. In addition to his duties as bookkeeper, he also acted as night watchman there and kept books in a grocery store. After two years of this work he spent two years as bookkeeper in the woolen mill of G. N. & J. A. Smith, Cherry Valley.

In 1873, when he was twenty-one years of age, he became bookkeeper and salesman for Sanford & Co., stationers and booksellers, where he remained for five years, gaining valuable experience.

In 1878 he received an offer from the G. Henry Whitcomb Co., envelope manufacturers. In the Whitcomb factory he learned the envelope business in all its phases, for his work had to do with the buying of stock and selling of goods as well as the manufacturing and accounting. As salesman he developed exceptional ability. He acquired an acquaintance and knowledge of the trade throughout the country that meant much to him throughout all his life.

He left the G. Henry Whitcomb Co. in 1882 to enter a partnership with George H. Lowe, of Boston, under the firm name of Logan & Howe Envelope Co. The partnership was dissolved the following year, however, when Mr. Logan was invited to become a partner in the Whitcomb Company. In February, 1884, Mr. Logan again left the Whitcomb Company, and became associated with Henry D. Swift, D. Wheeler Swift, and John S. Brigham, under the corporate name of the Logan, Swift & Brigham Envelope Co., whose factory became one of the most extensive and completely equipped for manufacturing envelopes in the United States.

In 1898 the company was consolidated with nine other large envelope concerns, under the corporate name of United States Envelope Company. Mr. Logan became its first vice-president and general manager and chairman of

the executive committee. For more than twenty-five years he was the general manager of the company and no small part of its success is due to his efforts and work, especially during the critical years just after its organization. In 1922, on the death of G. Henry Hutchins, he was elected president of the company.

Mr. Logan always took a prominent place in public life. For many years he was a leader in the Republican party in the city and the state. Although he was urged to take public office it was not until 1908 that he felt free to accept such honor. For four years, 1908 to 1911, he served Worcester as mayor. His administration began with ambitious plans for much needed civic improvements. He put into operation a new system of accounting by means of which a material saving was affected and under which the costs of doing the work of the city were accurately determined and the financial condition of the city could be ascertained at any time. While he undertook improvements in all departments of the city, he managed by various economies to keep the tax rate at about the usual level. The improvements made during his four years in office included permanent street paving, reduction in cost of municipal lighting, development of the water system with reduction of water rates, and establishment of new hospitals, libraries, trade schools, and playgrounds.

Throughout his life Mr. Logan had a deep interest in the work of the Y.M.C.A., state as well as local. For more than twenty-five years he had been a member of the state executive committee of Massachusetts and Rhode Island. During the World War he served on the National War Work council of the Y.M.C.A., and when the council dissolved he served as one of the trustees of the war funds. Twice he was chairman of the New England district in the war drives. He also served as New England chairman for the United War Work drive during the last year of the War.

Since 1878 Mr. Logan had been a member of Central Congregational Church and for many years served as senior deacon and was identified with all the movements that made for its advancement.

Mr. Logan served as a trustee of the Worcester Polytechnic Institute for nearly thirty years, and was given an honorary degree of Doctor of Science by the Institute in 1926. He has lectured on business topics there as well as at Amherst, Dartmouth, Harvard, and Wellesley. In 1904, Dartmouth College bestowed on Mr. Logan the degree of Master of Arts.

He has written many articles for magazines. His book, "The Red Envelope," is a history of the development of the envelope industry in this country.

In 1913 Mr. Logan represented the Worcester Chamber of Commerce in a delegation of New England business men which made a tour of the South American republics, with the hope that there might be created closer commercial relations between the United States and South America. On his return, he was one of the speakers and presided at the Pan-American Conference which was held at Clark University.

It would seem difficult to enumerate the different organizations with which James Logan was identified during his life, to each of which he brought a splendid contribution. He had been an Associate of the A.S.M.E. since 1904, was a member and past president of the Congregational Club, a director of the old Board of Trade, a member of the Chamber of Commerce, a member of the Economic Club, of which he was president in 1916; a member of the Worcester County Mechanics Association, in which he had also served as president, and a member of the Worcester Light Infantry and their Veteran Association. He had always shown a keen interest in and contributed to the work of the Boys' Club.

He was formerly a trustee of the Worcester County Institution for Savings; a member of the Grade Crossing Commission in 1898, a former trustee of the City Hospital and of the Bancroft Scholarship. In 1919 he served as an advisory member of the President Wilson's Industrial Conference Commission. In 1922 he was appointed to represent the Paper Trade on Secretary Hoover's Advisory Committee on Foreign Commerce. He served as one of the trustees of the Sinking Fund Commission of the city of Worcester; and was a member of the Parks Commission and a director of the State Mutual Life Assurance Company.

For almost fifty years he had been a member of the Masonic Fraternity. In 1925 he was presented with the Henry Price Medal, which is given only in recognition of distinguished Masonic and civic service.

On the occasion of his seventieth birthday fifty of his friends and business associates gave a dinner in honor of the "Grand Old Man of Worcester," and presented him with a silver tea service.

William James Albert London

William James Albert London, works manager of the Reider-Ericsson Company, Walden, N. Y., died suddenly of apoplexy on November 14, 1929, at his home in Walden. He is survived by his widow, Florence Smith London.

Mr. London was born at Hylton-near-Sunderland, Durham County, England, on March 3, 1876. He was the son of Joseph Augustus London, paper manufacturer of Oxford, and Sarah (Ainsworth) London.

Mr. London received his primary education at Dame Allan's School, Newcastle-on-Tyne, England. In 1893, he was apprenticed to C. A. Parsons & Co., Heaton Works. Newcastle-on-Tyne, England, where he attended a full course of classes at Armstrong College. He also studied at the College of Science, Durham University. Upon completion of his apprenticeship, in 1894, he remained with the company as draftsman on steam turbine condenser and turbo-generator work. In 1900 he joined Brown, Boveri & Co., of Baden, Switzerland, who at that time acquired a license under the Parsons' steam-turbine patents. After two years there, he entered the employ of the British Westinghouse Company at Trafford Park, near Manchester, becoming responsible for steam-turbine development then being undertaken there.

In 1906, George Westinghouse, impressed with London's versatility as a designer, had him transferred to the East Pittsburgh works of the Westinghouse Machine Company, where he carried out some special experimental work, principally in connection with marine propulsion. This special work being concluded, in 1908, he accepted a position as chief engineer of the Terry Steam Turbine Company, of Hartford, Conn. The Terry Company was at that time building small single-wheel turbines of the general type developed by Riedler-Stumpf in Germany. By London's persistent endeavor, the efficiency of the Terry turbine was established and methods of calculation evolved that permitted the prediction of efficiencies that could be demonstrated by tests. He further developed a series of multi-stage turbines adaptable to condensing service, ever striving for rational standardization and simplicity in design.

In 1915 Mr. London left the Terry company, and after a short period of consulting service for the Sterling Blower Company, joined the General Electric Company, at Lynn, Mass., where for a year he was in charge of design work on certain of the smaller turbines.

In the following year, evidently with the desire of having freer scope for his aims toward excellence, standardization, and simplicity in design, he organized the Steam Motors Company, with offices at Springfield, Mass., and a plant at Chicopee Falls, Mass. He served that company as chief engineer and general manager from 1917 to 1922, during which time it built some 400 steam turbines up to about 300-hp. capacity. These turbines were for direct connection to various kinds of auxiliary drives, such as pumps, etc. The turbine disk was overhung from the shaft of the driven machine.

The Steam Motors Company having been taken over by the Troy Machine Company, of Troy, N. Y., Mr. London then organized the London Steam Turbine Company, which existed until 1923, building similar turbines for stoker, pump, and small generator drives.

About 1919, Mr. London established relations with the Combustion Engineering Company and carried on, in connection with Steam Motors Company at Springfield, some designs of coal pulverizers, later giving the most of his time to consultation with the Combustion Engineering Company.

In 1927, he became associated with the Peabody Engineering Company and undertook some important developments in coal pulverization at the works of the Reider-Ericsson Company in Walden. At the successful conclusion of these tests, in January, 1929, he became works manager of the Reider-Ericsson Company.

Ill health, in part resulting from an injury in connection with his work on coal pulverizers, followed him in his later years.

London's talent in art and his love of music are not common knowledge.

He was a pen-and-ink artist of no mean ability and had considerable skill in water-color work. No doubt these talents added to his versatility and resourcefulness in designing, and because of them he was able to portray rapidly on paper thoughts of design with an ability beyond that of most engineers.

Mr. London became a member of the A.S.M.E. in 1910, and up to the time of his death served as a member of the Subcommittee on Steam Turbines of the Power Test Codes Committee. He was also a member of the Institute of Naval Architects and Marine Engineers, the American Society of Naval Engineers, and the Engineers' Club of New York. He was an associate member of the Institute of Mechanical Engineers of Great Britain.

Mr. London served on one of the Committees of the Emergency Fleet Corporation during the World War.

He was a prolific patentee and wrote numerous articles on steam turbine design, and during the last few years, on the subject of coal pulverization.

Zenas N. Lord

Zenas N. Lord, general foreman, General Electric Company, West Lynn, Mass., died of angina pectoris on December 6, 1929.

Mr. Lord was born on December 5, 1864, at East Dennis, Mass., the son of Seva W. and Elizabeth D. (Nickerson) Lord. He served an apprenticeship as a steamfitter with H. W. Heath, Lynn, and worked at that trade for two years. In 1887 he took charge of the piping department of the Thomson-Houston Electric Company, and when this company was consolidated with the General Electric Company, he continued in charge of the Lynn Works. He was a member of the Quarter Century Club of the company, and a recipient of its Coffin Award.

Mr. Lord was charitably interested in the local schools, churches, Y.M.C.A., and Lynn Hospital, was a member of the Odd Fellows, and director of the Sagamore Trust Company. He had belonged to the A.S.M.E. since 1915.

Surviving Mr. Lord are three sons and three daughters, and his widow, Bessie M. (Tulloch) Lord, whom he married in 1911. His first wife, Margaret Ann (Manning) Lord, died in 1907.

George Owen Madigan

George Owen Madigan, chief inspector of machinery, Provincial Government of British Columbia, Vancouver, B. C., Canada, died on April 18, 1929.

Mr. Madigan was born on April 19, 1864, at Victoria, B. C. and was educated at St. Louis College there. He served an apprenticeship as machinist with the Albion Iron Works of Victoria, and since 1901 had been inspector of boilers, for two years at Nelson, B. C., and the remainder of the time in charge of the Vancouver office. He was appointed chief inspector on superannuation in 1928.

Mr. Madigan became a member of the A.S.M.E. in 1929. He also belonged to the Professional Engineers of British Columbia.

Walter MacGregor

Walter MacGregor, general superintendent of the Wheeling Mold & Foundry Company, Wheeling, W. Va., died at Wheeling on June 6, 1929.

Mr. MacGregor was born at Bay City, Mich., on April 13, 1876, the son of Duncan George and Martha (MacDonald) MacGregor. He obtained his early education in Bay City and also served an apprenticeship there in stationary steam engineering. The degree of B.S. in mechanical engineering was conferred upon him by the University of Michigan in 1901, and an M.E. two years later.

Other practical experience was secured by Mr. MacGregor prior to his graduation in connection with the construction of a dam at Batesville, Ark., by the U. S. Engineer Corps., and in drafting for the American Radiator Company, Detroit, Brown Hoisting Machine Company, Cleveland, and Whiting Foundry & Equipment Co., Harvey, Ill.

In 1903 Mr. MacGregor secured employment with the American Steel Foundries Company, Chicago. He remained with this company until 1912, in

design and construction work. Among the plants on which he worked were those at Indiana Harbor, Ind., Chester, Pa., and Sharon, Pa.

From 1912 to 1922 Mr. MacGregor was connected with the Timken Detroit Axle Company, first as efficiency engineer, then as superintendent of the Detroit plant, and for five years as manager of the malleable plant at Canton, Ohio.

During the last seven years of his life Mr. MacGregor was with the Wheeling Company. He was promoted from the position of works engineer to that of assistant to the works manager, and finally was appointed works manager.

Mr. MacGregor is survived by his widow, formerly Miss Marion Kay Knapp, whom he married in 1910, and by three daughters and one son. He had been a member of the A.S.M.E. since 1906.

Arthur Royal McArthur

Arthur Royal McArthur, president of the Gary (Ind.) Board of Education and chief mechanical engineer of the Gary tin mills of the American Sheet & Tin Plate Co., died suddenly of heart trouble at his home in Gary on March 11, 1929.

Mr. McArthur was born on September 29, 1873, on a farm near Johnstown Center, Rock County, Wis., one of five children of Arthur and Mary McArthur. His father, a native of Scotland, had emigrated to this country with his parents at the age of six. Mr. McArthur attended Milton College, at Milton, Wis., for three years and then the University of Wisconsin, at Madison, from which he received the degree of B.M.E. in 1900. He was a member of Tau Beta Pi, honorary engineering fraternity.

Following his graduation Mr. McArthur worked on drafting and general design for the American Sheet & Tin Plate Co., at the Elwood, Ind., plant. At the beginning of 1901 he was transferred to the works at Atlanta, Ind., as master mechanic, and in the following year was given charge of the boiler plant at the American works of the company. In 1903 and 1904 he was engaged in the design of machinery and furnaces as chief draftsman and in 1905 was appointed chief engineer and given supervision over district construction work. The next year he was again promoted, becoming district engineer of the company in charge of the mechanical force and machinery of the American, Morewood, Anderson, Midland, and Piqua works. He was sent to Gary as chief mechanical engineer of the sheet mills in 1910 and transferred in the same capacity to the tin mills when they were constructed in 1916.

Mr. McArthur took an exceptional interest in civic and church affairs. As president for nearly twelve years of the Gary school board, to which he was named in June, 1917, he not only devoted himself to the improvement of the school system and the construction of modern schools with spacious playgrounds, but also kept in close touch with the pupils themselves and with school events. Likewise as a lifelong member of the Presbyterian church and an elder in the church of that denomination at Gary throughout his residence there, and a trustee of the Gary Y.M.C.A. since the inception of that institution at Gary in 1910, he played a very active part in the progress of those organizations. He had been a member of the A.S.M.E. since 1906 and also belonged to the Masonic fraternity.

Surviving him are his widow, Mattie (McKenzie) McArthur, whom he married in 1902 ; two sons, Robert E. and Donald A., both employed in the Gary tin mills ; and one daughter, Margaret, of high-school age.

Thomas William McKernan

Thomas William McKernan was born on July 16, 1893, at Philadelphia, Pa., of English parents. He received his early education in the public schools of New York, and studied engineering at Cooper Union. For five years he was connected with the Green Fuel Economizers Company, New York, engaged in drafting, engineering, and sales. He then entered the employ of the B. F. Sturtevant Co., with which he remained until his death, on March 8, 1929.

During the early years of his association with the Sturtevant Company Mr. McKernan worked on sales engineering of fuel economizers for steam

boilers, first at Philadelphia and later at Hartford, Conn. In 1914 he took charge of gas engineering in the New York office of the company. He made a number of improvements in apparatus for the gas industry, particularly in blowers, and assisted various companies in developing and improving ventilating equipment.

Mr. McKernan spent his leisure time in traveling and golf. He belonged to several golf clubs, as well as the Metropolitan Golf Association. He had been an associate-member of the A.S.M.E. since 1921. He is survived by his widow, Emma Kate McKernan, whom he married in 1917.

Luther B. McMillan

Luther B. McMillan was born on September 21, 1891, in the little town of Bem, Missouri, where his father was a farmer. Shortly after his birth the family moved to another farm near Anchor, Texas. His early education was that of the usual boy in a small town, where he attended the public school and later the local high school, finally entering the Texas Agricultural and Mechanical College as a sophomore in the fall of 1908, where he elected the course in mechanical engineering. Because of somewhat limited finances it was necessary for him to support himself while at college, and during successive terms he waited on table in the college mess hall, collected students' laundry, tutored at a students' summer camp, and on several occasions served on local surveying parties. During the winter of 1911 he was badly burnt in a fire in the college mess hall, the stairs collapsing when he was descending from the second floor, where valuable records had been stored.

During his college course Mr. McMillan gave indication of that calmly analytical mind which ultimately brought him recognition as one of the leaders of his profession. He was an outstanding student in the applied sciences, and although at this time he intended to make teaching his life work, such was not to be his destiny. He was graduated as a Bachelor of Science in 1911, and took graduate work in 1912 and 1913 while serving as an instructor in mechanical engineering, receiving the degree of Mechanical Engineer in 1912 and that of Chemical Engineer in 1913.

Mr. McMillan was awarded a fellowship in engineering at the University of Wisconsin during the years 1913 and 1914, and served as instructor in steam and gas engineering at that institution. He became deeply interested in developing a better method of testing commercial pipe covering, and presented a paper entitled the "Heat-Insulating Properties of Commercial Steam Pipe Covering" which won the Junior Award of The American Society of Mechanical Engineers. This paper came to the attention of the executives of the Johns-Manville Corporation, who secured his services to standardize their methods of testing thermal insulation at their Manville factory. Shortly after completing this work, he became chief research engineer for the same company, and was called upon to develop improved types of insulation, as well as to design special applications of insulation for numerous industries, among which might be mentioned the insulation of large wood digesters, insulations for open-hearth-furnace regenerators, various types of boiler-furnace insulation, and in fact insulation for any and all types of structure where the flow of heat must be kept to a minimum. While adequate and economic thermal insulation is today one of the principal considerations of the designing engineer, the work of McMillan beginning in 1916 focused attention on a subject which has had an ever-expanding growth, and he may well be considered a pioneer in placing this great industry on a strictly scientific basis.

In 1926 Mr. McMillan was made consulting engineer for the Johns-Manville Corporation, which enabled him to give even more time to research and thought on problems of heat flow, and hence to develop the underlying fundamentals of the science on a firmer mathematical basis.

In 1928 his company decided to rehabilitate the old laboratory which Mr. McMillan had established for them in 1916, with a view to building the finest research laboratory on thermal insulation which ample funds could provide. This project was nearing completion at the time of his death, and it is gratifying to note that this splendid structure will be known as the McMillan Laboratory in memory of his scientific achievements in the field of insulation engineering.

During the years from 1916 to 1929 Mr. McMillan contributed many notable papers to the scientific press, among which might be mentioned "Heat Transfer through Insulation in the Moderate- and High-Temperature Fields," "The Insulation of Open-Hearth-Furnace Regenerators," "Selection of Insulation for Steam Distribution Systems," and "Heat Insulation in the Modern Steam-Generating Plant." He also prepared technical data for both Kent's and Mark's Mechanical Engineers' Handbooks, for the American Society of Heating and Ventilating Engineers' Guide, the Handbook of the National District Heat Association and similar publications.

Due to his recognized scientific standing in his chosen field, as well as his engaging personality and well-balanced outlook on men and affairs, Mr. McMillan attained a place of distinction in various scientific societies and organizations. Having become a member of the A.S.M.E. in 1913, he was made one of its managers as well as a member of the Council, and served with distinction on various committees.

He was also Chairman of the Insulation Committee, as well as a member of the Executive Committee of the Committee on Heat Transmission of the National Research Council, and in that capacity was instrumental in developing test codes for determining the thermal characteristics of insulations in various temperature ranges, as well as numerous other committee activities dealing with the retardation of heat flow.

Mr. McMillan was a member of, and active in, other scientific organizations such as the American Society of Heating and Ventilating Engineers, The American Society of Refrigerating Engineers, and the Society of American Military Engineers. Among his clubs were the Engineers' Club of New York, the Western Universities Club, and the Texas Agricultural and Mechanical College Club of New York.

After a trip to Europe in 1927 in the interests of his company, during which he traveled largely by air, Mr. McMillan became an ardent aviation enthusiast. He purchased his first plane in the fall of 1928, and a second and more powerful one shortly after. On August 9, he took off from the Metropolitan Airport at Newark, New Jersey, accompanied by a passenger. At an altitude of about 600 feet the airplane went into a tail spin and crashed into the adjoining meadows. Neither Mr. McMillan nor his passenger regained consciousness before death closed the chapter, and hence the cause of the accident will remain unknown.—W. V. A. KEMP.

Stephen Allan Merselis

Stephen Allan Merselis, whose death from meningitis occurred at Clifton, N. J., May 25, 1929, was born at Clifton, N. J., on October 3, 1896, the son of Stephen and Minnie Clinton (Baker) Merselis. He secured his early education in the schools of Clifton and Passaic. He attended the Stevens Institute of Technology for two years, and the Massachusetts Institute of Technology for three, receiving a B.S. degree in mechanical engineering in 1920.

For a year following graduation, Mr. Merselis assisted in the supervision of the mechanical department of the Southern Cotton Oil Company, of Bayonne, N. J. He then became connected with the Combustion Engineering Corporation in New York, where he served on engineering work and in the estimating department. In January, 1927, he was transferred from the subsidiary company to the parent company, International Combustion Engineering Corporation, where he served as chief assistant to the vice-chairman of the Technical Advisory Board, fulfilling the duties of secretary of the Board, and also as assistant manager of the Foreign Department.

Mr. Merselis became a junior member of the A.S.M.E. in 1922. He was very active in alumni work of both M.I.T. and his fraternity, Phi Sigma Kappa.

Mr. Merselis is survived by his widow, Marion Adèle (Dacy) Merselis, whom he married in 1923, and by one daughter, Marilyn.

Samuel Wylie Miller

Samuel Wylie Miller, consulting engineer of the Union Carbide and Carbon Research Laboratories, Inc., Long Island City, L. I., N. Y., and one of the pioneers in the development of oxy-acetylene welding, died on February 3, 1929, at his home at Hollis, Long Island.

Mr. Miller was born in New York, N. Y., in December, 1867, the son of Walter Thomas and Christiana (Wylie) Miller. He received his engineer's degree from Stevens Institute of Technology in 1887. The first years of his career were spent with the Pennsylvania Railroad. After serving an apprenticeship as machinist at the Logansport shop, he spent one year as fireman on the Pittsburgh Division, and another as draftsman in the motive power office. He was next located for three years at the Columbus shop, where he gained a varied experience in foundry work, testing machinery and locomotives, and power plant design. From 1894 to 1899 he was assistant to the superintendent of motive power, and during the following year general foreman at the Dennison shop. From then until 1906 Mr. Miller was master mechanic for the road, and was located successively at the Indianapolis, Logansport, and Columbus shops.

After a period of four years with the American Locomotive Company in an executive capacity at Dunkirk, N. Y., Providence, R. I., and Scranton, Pa., he founded the Rochester Welding Works at Rochester, N. Y., where he conducted a considerable amount of research work resulting in several important contributions to the industry. During the World War he served on the Welding Committee of the Emergency Fleet Corporation. In 1921 he joined the Union Carbide and Carbon Research Laboratories as consulting engineer, the position he held at the time of his death.

Mr. Miller is credited with having been among the first to visualize the possibilities of the oxy-acetylene process and its applications. His contribution to the technique of boiler and pressure vessel construction, standardization, and safety, particularly with respect to the applications of fusion welding, won for him a prominent position in the industry. He was the author of many papers on welding which were presented before engineering societies, and wrote several books on the subject.

Mr. Miller joined the A.S.M.E. in 1918 and was a very active member of the Boiler Code Committee. He served on two important sub-committees, and on numerous special committees and investigations where his experience, knowledge, and judgment were of great value. Resolutions testifying to the esteem in which he was held by his associates on the committee were passed at its meeting on February 8, 1929.

Mr. Miller was a director and past-president of the American Welding Society and the donor of the Miller Medal, awarded annually by that society for work of conspicuous merit in advancing the art and science of welding. He was also a director of the American Bureau of Welding and chairman of the Oxy-Acetylene Committee of the International Acetylene Association, and belonged to the American Institute of Mining and Metallurgical Engineers, the American Society for Steel Treating, the British Iron and Steel Institute, the Institute of Metals, and other scientific and engineering organizations. He was a member of the Masonic fraternity.

His widow, Ella (Zubrod) Miller, survives him.

David Livingstone Moffat

David Livingstone Moffat, president of the Moffat Engineering Company, West New Brighton, Staten Island, N. Y., died on September 22, 1929, from angina pectoris.

Mr. Moffat was born in Glasgow, Scotland, on February 21, 1879, the son of John and Jessie (Richardson) Moffat. Following the completion of his grammar school education he secured technical training at the Glasgow Technical College, and served an apprenticeship in the drawing room of the Hyde Park Locomotive Works in Glasgow.

Remaining in Scotland until 1905, Mr. Moffat was chief draftsman for two cargo ships for the Anchor Line and also was in charge of design of locomotives and general machinery, including drydock pumping machinery, for A. Barclay Sons & Corp., Kilmarnock.

Mr. Moffat came to the United States in 1905 and became assistant chief draftsman for the Stanley Machine Corporation, Lawrence, Mass., working on placer dredging machinery, bottle labelling machines, and shoe manufacturing machinery.

From 1906 to 1917 Mr. Moffat was connected with the Fore River Shipbuilding Corporation, Quincy, Mass., and from then until 1923 with the Standard Shipbuilding Corporation, Shooters Island, N. Y. He was in charge of the entire drafting force of the former organization and personally designed boilers and engines, pumps, condensers, and all auxiliaries not of standard manufacture for battleships, torpedo boats, freight ships, tugboats, steam trawlers, dredges, steam yachts, etc. His work with the Standard Shipbuilding Corporation was similar in nature and extended also to designs for yard buildings, special machinery and cranes, and to supervision of construction and trials of machinery. He resigned his position as chief engineer of this company to serve in a similar capacity with the Hard Coal Briquet Company. The following year he became president of the Moffat Engineering Company.

Mr. Moffat became a member of the A.S.M.E. in 1921. He also belonged to the American Society of Naval Architects and Marine Engineers and the Masonic fraternity. He had contributed articles to marine engineering periodicals.

Mr. Moffat is survived by his widow, formerly Miss Mabel Stanley Crawford, whom he married in 1907.

Frederick William Moses

Frederick William Moses, chairman of the Board of Directors of the Firemen's Mutual Insurance Company, Providence, R. I., died in Boston, Mass., on December 31, 1928, of cerebral hemorrhage.

Mr. Moses was born in Lebanon, N. H., on September 1, 1858, and attended the public schools of that town. He then became associated with his father in the manufacture of furniture in Lebannon and later in Brooklyn, N. Y. In 1886 he became affiliated with the Cotton & Woolen Manufacturers Mutual Fire Insurance Company of Boston and its affiliated companies, in which companies he held the position of secretary. In 1909 he resigned from these companies to accept the presidency of the Firemen's Mutual Insurance Company of Providence, later becoming the president of the Baltimore Mutual Fire Insurance Company of Baltimore, Md., the Union Mutual Fire Insurance Company, the Mercantile Mutual Fire Insurance Company, and the Narragansett Mutual Fire Insurance Company, all of Providence. In 1926 he resigned as president of these companies, accepting the position which he held at the time of his death.

His interest outside his profession included hunting, fishing, and farming. He had been an associate of the A.S.M.E. since 1919.

Mr. Moses is survived by his widow, formerly Miss Anna S. Taft, of Ayer, Mass., whom he married in 1883, and by three children, Frederick Taft Moses, Carl Alan Moses, and Kathleen Elizabeth (Moses) Woodward.

John Seiser Mucklé

John Seiser Mucklé, retired engineer and inventor, died suddenly of coronary thrombosis at his home at Haverford, Pa., on March 20, 1929. He was widely known as host to distinquished foreigners, as well as to many notables of this country. He served as chairman of the Citizen's Reception Committee of Philadelphia during the administration of Mayor Kendrick (1924-1928). His particular interest in this direction, however, dated back to 1912, and ever since 1915, when his retirement from business gave him more leisure for entertaining, eminent men and women of practically very country in the world had been guests of Colonel and Mrs. Mucklé, either at Haverford or their Philadelphia home.

Colonel Mucklé was a native of Philadelphia, where he was born on December 12, 1862, the son of Mark Richards and Caroline (Seiser) Mucklé. His education was in private schools, first at a German School, then at the Episcopal Academy, and later at the South Broad Street Military Academy, Philadelphia. After serving a four-year apprenticeship in his brother's firm of M. R. Mucklé, Jr. & Company, he took charge of the construction department of the company. The firm handled city lighting, water pumping stations, sewage plants, and the erection of power plants for different firms, and much of the mechanical engineering for the Du Ponts and the Pennsylvania Railroad. He became a member of the firm in 1885 and remained with it until its dissolution in 1907.

Colonel Mucklé used to tell many anecdotes of his early days in engineering, and envied modern engineers their tables of constants. In a day when such tables did not exist and engineering was more or less a matter of experimentation, he was considered an expert on plant construction and field work. His firm were agents for Worthington pumps and Westinghouse products, the installation of many of which he supervised. One of his chief works was the design and installation of the Philadelphia high-pressure pumping station, said to have been the first of its kind in this country, and the principles of which were patented by him.

After the dissolution of the Mucklé firm, Colonel Mucklé organized the Standard Elevator Interlock Company for the installation of elevator safety door devices patented by him. In 1915 the company was absorbed and the patents purchased by the Otis Elevator Company.

During the Spanish-American War he served as lieutenant and was in charge of the auxiliary naval force of the 4th Lighthouse District. Just prior to the war he had been elected commander of the Pennsylvania Naval Militia. In June, 1899, he was appointed naval aide on the staff of Governor Stone, with the rank of colonel. He was reappointed by Governor Stuart. Before and during the World War Colonel Mucklé was active in the Red Cross, and served as a delegate to the International Red Cross Conference in Washington in 1912. During the World War he was a member of the British and Canadian Recruiting Mission.

In 1920 Colonel Mucklé was knighted by the King of Italy with the Order of the Crown of Italy "for services to Italy and her Allies." In 1925 he was raised in this order to the degree of "Cavalier Officer."

Among the organizations of which he was a member were the American Academy of Political and Social Science, Society of American Wars, the Historical Society of Pennsylvania, Military Order of Foreign Wars, Naval and Military Order of the Spanish-American War, Naval Order of the United States, and the Pennsylvania Academy of the Fine Arts. He became a member of the A.S.M.E. in 1904. He was president of the Pennsylvania Seamen's Home, Philadelphia, vice-president of the British branch of the English-Speaking Union, and an honorary member of the Canadian Society of Philadelphia. His local clubs were the Merion Cricket, Union League, Church, and Philadelphia Country. He also belonged to the Army and Navy Club in New York, and the Garrison Club in Quebec, Canada. He was a Republican, an Episcopalian, and a member of the Masonic fraternity.

Colonel Mucklé is survived by his widow, the former Katharine Craig Wright, of Philadelphia, whom he married in 1901, and by one son, Craig Wright Mucklé.

David Walter Munn

David Walter Munn, professor of mechanical engineering at the Nova Scotia Technical College, Halifax, N. S., Canada, died at his home in that city on January 23, 1929, of heart trouble, with which he had been confined to his home for several months.

Professor Munn was born at Quebec, Canada, on September 9, 1877, the son of William and Adelaide (Moore) Munn. He attended the Quebec High School, where he made an excellent record. He held bachelor's and master's degrees in arts and science from McGill University, and was given an M.S. degree from the Massachusetts Institute of Technology in 1914 for research work as a Fellow there.

Following the receipt of his B.A. degree in 1898 Professor Munn devoted himself to the teaching profession and to further studies, with the exception of a short time as draftsman on general machine shop and boiler work for the Caledonian Iron Works of Montreal. For some years subsequent to 1904 he was located at McGill University, Montreal, where he was a student and member of the Faculty of Applied Science for several years, spent more than a year on the coal testing staff of the Canadian government, making boiler and gas engine tests, and was a demonstrator in mechanical engineering. From 1908 to 1913 he was professor of mechanical engineering at the McGill University College, now the University of British Columbia, at Vancouver. He lectured in mathematics and installed new shops. He spent one summer during these years as student apprentice in the foundry and machine shop of

Allis-Chalmers-Bullock Ltd., in Montreal, and another summer as designer on mechanical and hydroelectrical work for the Western Canada Power Company, at Vancouver, thus securing practical experience to supplement his University studies.

After a year as a graduate student at the Massachusetts Institute of Technology, Professor Munn accepted an appointment in 1914 as assistant professor of general engineering and lecturer in mathematics at the School of Mining at Queen's University, Kingston, Ontario, Canada.

From 1915 to 1919 Professor Munn engaged in engineering work with various steel companies. In 1915-1916 he assisted the Steel Company of Canada, Montreal, in the layout and installation of new munitions plants; spent a year as designer on general plant maintenance and improvements for the Algoma Steel Corporation Ltd., Sault Ste. Marie; served Armstrong-Whitworth of Canada Ltd., Longueuil, Quebec, as chief engineer in charge of maintenance and improvements in a new powdered coal plant manufacturing carbon and high speed steel in crucibles and electric furnaces; and in 1918 and 1919 was again associated with the Steel Company of Canada, Montreal, as assistant engineer.

He returned to the teaching profession as professor of engineering in charge of the Department of Engineering at the Royal Military College, Kingston. His work there included installing and equipping new testing and mechanical laboratories. Since 1921 he had been located at the Nova Scotia Technical College. During this period he also engaged in consulting work and planned and developed a scheme for testing and marketing the coals mined in Nova Scotia.

Professor Munn became a member of the A.S.M.E. in 1915. He also belonged to the Engineering Institute of Canada. American Association for the Advancement of Science, Society for the Promotion of Engineering Education, and Society of Professional Engineers of Nova Scotia. He was a member of the Board of Governors of the Nova Scotia Technical College and of the Nova Scotia Advisory Board for Fuel Research.

Professor Munn is survived by his widow, formerly Miss Theodora Christine Bouchard, of Montreal, and by two children, Katherine Adelaide and David Beresford Munn.

Gardner A. Murfey

Gardner A. Murfey, treasurer and chief engineer of The Browning Crane Company, Cleveland, Ohio, was born in that city in October 3, 1884. He received an S.B. degree from Massachusetts Institute of Technology in 1908, and engaged in various lines of engineering work during the next seven years. He had been connected with The Browning Crane Company since 1915, and his duties included entire responsibility for the design and testing of machines, management of power plant and distribution of power through the plant, maintenance of motors, etc., and maintenance of buildings.

Mr. Murfey became a member of the A.S.M.E. in 1923. He was also a member of the Cleveland Engineering Society. His death occurred on September 13, 1929.

Thomas Edward Murray

Thomas Edward Murray, who for many years was in charge of all the allied Edison companies in New York and Brooklyn, and subsidiaries in Westchester County, and to whom, next to Thomas A. Edison, had been granted more patents than to any other inventor in the United States, died from heart trouble on the morning of July 21, 1929, at his summer home, Wickapogue, Southampton, N. Y. He had been a member of the A.S.M.E. for thirty-five years and was a Fellow of the A.I.E.E.

Mr. Murray was born at Albany, N. Y., on October 21, 1860, the son of John Murray and Anastatia McGrath, and received his education in the public and private night schools in that city. He served his apprenticeship as machinist in various local shops and later became an operating engineer at the pumping plant of the Albany Water Works. In 1887 the late Anthony N. Brady, who had recently entered the field of public utilities, engaged Mr. Murray to take charge of the power station of the Municipal Gas Company of Albany, and

in that company his rise was rapid. He soon had complete charge of this company and was called into consultation on various other Brady properties, among them the Albany Railway Company, Troy City Railway Company, Troy Electric Light Company, Kings County Electric Light & Power Company, and various other companies throughout the country. Mr. Murray was instrumental in consolidating the electric companies in Brooklyn which resulted in the formation of the Edison Illuminating Company of Brooklyn, afterwards changed to the Brooklyn Edison Company.

In 1895 Mr. Murray went to New York City in connection with the Brady interests, and after the consolidation of the electric properties in Manhattan, became vice-president and general manager of the New York Edison Company. He later became senior vice-president and finally vice-chairman of the Board of this company. Prior to his retirement in 1928, Mr. Murray was also president of the Yonkers Electric Light and Power Company, and vice-president of the United Electric Light and Power Company, and a director in all these companies. One of Mr. Murray's outstanding accomplishments was the building of the great power stations which supply New York City. Among these stations are the Waterside No. 1 and No. 3, Sherman Creek, Hell Gate, Gold Street, Hudson Avenue, East River, and the Williamsburgh Power House. He was also the designer of steam plants in Albany, Utica, Rochester, and Dayton, as well as hydroelectric plants at Chattanooga, Tenn., Trenton Falls and Cohoes, N. Y. The total installed capacity of these plants is probably greater than that by any other man in the industry.

Mr. Murray also organized Thomas E. Murray, Inc., the Metropolitan Engineering Company, the Metropolitan Device Corporation, and the Murray Radiator Company.

Notwithstanding the fact that most of his interest was in the electrical industry, the force of his activities has been felt in almost every phase of modern industry. For innumerable inventions of safety appliances he received the Longstreth Medal from the Franklin Institute of Philadelphia. During the World War his method of welding shells was found to be the only one that could be used for the production of the 240-mm. mortar shell, winning him high commendation from the War Department.

Mr. Murray had a very inventive mind and he was the pioneer in the following fields: Water wall furnaces for steam boilers, copper radiators, electrical protective devices, cinder catchers, pulverized fuel equipment, automatic welding machines, and many others.

Mr. Murray was president of the Association of Edison Illuminating Companies for two years. Among the many honors he received were the honorary degrees of Doctor of Science conferred by Villanova College and Georgetown University, and Doctor of Laws conferred by Fordham University and Brooklyn College.

In addition to his activities in the fields of public utilities and engineering, Mr. Murray was active in religious work. He took a prominent part in the affairs of the Roman Catholic Church, and his activities were rewarded by the conferring on him of membership in the order of the Knights of St. Gregory and the Knights of Malta. He was one of the few persons in the United States with the privilege of a private oratory in his home, where Mass might be celebrated.

Mr. Murray was married to Catherine Bradley of Brooklyn in 1887, and is survived by eight children—four sons and four daughters—and by thirty-seven grandchildren.

Emile Henry Nate

Emile Henry Nate was born at Newark, N. J., on September 22, 1879, the son of Adam and Eva (Meyer) Nate. He was graduated in 1900 from the Newark Mechanical Drawing School, and secured his early engineering experience with the Hewes & Phillips Iron Works. He became draftsman for Henry W. Bulkley, Orange, N. J., in 1902 and during four years in this connection worked on the design and manufacture of the Bulkley barometric condenser, vacuum pumps, heaters, and power plant design and erection. He was in charge of the machine and pattern shops.

After two more years in similar work with M. W. Kellogg Co., New York, Mr. Nate spent a year in travel and study, visiting power and industrial

plants in Canada. Upon his return in 1911 he joined the Thompson-Starrett Company, New York, where he engaged in general engineering and the design and installation of heating and ventilating systems.

In 1913 he organized the Nate-Earle Company, New York, for designing and installing power plants, heating and ventilating systems, and general industrial work. He served this company as president and treasurer until 1919. In 1914 he also went into partnership with A. N. Hammerston, of New York, and with the exception of the year 1920, until his death on September 14, 1929, continued to do consulting work as a member of the firm of Hammerston and Nate. In 1921 he opened an office in Colorado Springs, and did industrial designing for the Baker Steam Motor Car & Mfg. Co., Pueblo, Colo. In 1923 he was also retained by the Portland Gold Mining Company of Colorado Springs, for which he designed and supervised mine pumping stations, redesigned power plants and reduced coal consumption, redesigned and changed the entire electrical transmission systems, and electrified a large steam hoist for the Independence Mine of the Company. Since 1926 he had also served the Baker Oil Burner Company of Pueblo and Denver.

Mr. Nate became a junior member of the A.S.M.E. in 1904, and was promoted to the grade of full member in 1926. He was also a Mason. While living in the East he found relaxation in boating. Surviving him are his widow, Grace (Pennington) Nate, and two children, Grace May and William Henry.

Walter O. Nelson

Walter O. Nelson, assistant superintendent of the H. M. Nelson Machine & Iron Works, Inc., Newark, N. J., died on June 10, 1929. He had recently returned from the West where he had been employed by the General Petroleum Company.

Mr. Nelson was born in New York, N. Y., on February 23, 1903, the son of Alfred O. and Anna S. Nelson. After completing his high school education he worked for a few years as clerk for S. D. Leidesdorf & Co.; mechanical tracer for H. C. Meyer, Jr.; seaman, fireman, and oiler on the S. S. *Winyah*, belonging to the Barber Steamship Company; and wireman for the Western Electric Company. He then spent two years at Pratt Institute in Brooklyn, from which he was graduated in 1924. His first position was with the Standard Oil Company, assembling and testing Diesel engines at Jersey City, N. J.

Mr. Nelson became a junior member of the A.S.M.E. in 1928. He is survived by a brother, George Conrad Nelson.

William J. Neville

William J. Neville, one of the leading sales engineers of the South, who represented a number of power and industrial plant equipment manufacturers in the Southeast, was instantly killed in an automobile accident in Atlanta on November 2, 1929.

Mr. Neville was born near London, Ontario, Canada, on May 17, 1879, the son of James and Charlotte Neville. He received his early education in the schools of the Dominion. His first engineering experience was on steamships operating in the Great Lakes. For some time he served in the marine field as operating engineer and chief engineer of steam propelled vessels.

He later became connected with the Green Engineering Company in sales and service work, being attached to the Chicago and St. Louis offices. Through this connection, he built up a wide acquaintanceship throughout the Middle West.

Mr. Neville went to Birmingham in 1908 as chief engineer of the Birmingham Electric Company, and served as such until 1912, when he became the Southeastern representative of the Chapman Valve Manufacturing Company, Indian Orchard, Mass. About fifteen years before his death, he opened an office as an independent representative, retaining, however, representation of the Chapman account. From this beginning, he built up one of the largest offices of its kind in the South.

In addition to giving personal representation to several accounts, he was a member of the firm of Neville & Cleary, Inc., manufacturers' agents, with offices in Atlanta, Ga.

Mr. Neville became an associate member of the A.S.M.E. in 1915 and was a past-chairman of the Atlanta Section. He was also an active member of the Masonic fraternity, and belonged to several clubs.

He is survived by his widow, Florence (Willis) Neville, of Buffalo, N. Y., whom he married in 1906.

Theodore Walter Newburn

Theodore Walter Newburn was born at Hoopeston, Ill., on July 16, 1876, the son of L. W. and Susan (Boggs) Newburn. After completing his public school course at Hoopeston, he worked for the Sprague Manufacturing Company of that place to earn sufficient money to pay for his college education. He was graduated from Purdue University in 1902 with the degree of Bachelor of Science in mechanical engineering. Two years later Purdue University conferred upon him the degree of mechanical engineering.

Following his graduation Mr. Newburn was for a short time employed by the Cambria Steel Company at Johnstown, Pa., but left their service on August 1, 1902, to become a special apprentice of the Westinghouse Air Brake Company, at Wilmerding, Pa. A few months thereafter he was assigned to field service for the company, and in February, 1904, was regularly appointed as an inspector at Cleveland, Ohio, where he was located until August, 1909. He was then transferred to Columbus, Ohio, as mechanical expert.

On August 1, 1913, Mr. Newburn was appointed assistant resident engineer for the Southeastern District, with headquarters at Pittsburgh, Pa. He was made district engineer for the Southeastern District, with headquarters at Washington, D. C., on the first of January, 1920, and remained in that position until his death.

Mr. Newburn became a member of the A.S.M.E. in 1914 and also belonged to the Washington Society of Engineers, Southern and Southwestern Railway Club, Air Brake Association, and several Washington clubs. He was president of the Purdue University Alumni Club of Washington, and a member of Tau Beta Pi fraternity.

His death, which was the result of heart failure, occurred on a Pennsylvania Railroad train near Columbus, Ohio, on the morning of April 27, 1929.

He is survived by his widow, Florence (Payne) Newburn, and by one daughter.

George Mears Newcomer

George Mears Newcomer died at his home in New York, N. Y., on November 28, 1929, of heart trouble. His widow, Alice Kay Newcomer, whom he married in 1881, and three children, a daughter and two sons, survive him.

Mr. Newcomer was born on March 29, 1856, at Indianapolis, Ind., the son of Frisby Snively and Sarah (Irwin) Newcomer. His experience from the completion of his high-school work until 1895 was varied, and included accounting for the Keokuk & Northwestern R. R., St. Louis, Mo., Union Iron & Steel Co., Chicago, Ill., and Sooysmith & Co. during the construction of the piers for the A.T. and S.F. bridge over the Mississippi River. He was also connected with the Keystone Bridge Company as assistant secretary and engaged in business for himself in cotton ginning and electric railway supplies.

From 1894 until 1928, when he retired, he was vice-president and general manager of F. L. Smidth & Co., New York, whose business was the construction of cement producing plants and the manufacture of machinery and accessories for them.

Mr. Newcomer became an associate of the A.S.M.E. in 1914. He was a member of the Masonic fraternity and of several clubs.

Hjalmar Nordenmalm

Hjalmar Nordenmalm was born at Svedrup, town of Maine, Otter Tail County, Minn., on April 14, 1875, and died on March 12, 1929, at his home at Butler, Pa.

His father, Carl August Nordenmalm, who survives him, emigrated from Sweden to the United States shortly after the Civil War, and located in Lake City, Minn., where he married Matilda Cerelius. Later he moved to Otter Tail County, and in the early eighties to Hallock, Minn., where he engaged in extensive mercantile lines until 1890, when the family returned to Sweden.

Hjalmar Nordenmalm attended the public school of Hallock and Hope Academy, at Moorhead, Minn. In Sweden, together with his brothers and sisters, he received further education under the instruction of a private tutor. Subsequently he attended the Superior High School at Orebro, Sweden, and in 1894 entered the Technical College there, from which he received a mechanical engineering degree in 1897.

After working as an apprentice in a machine and foundry shop at Orebro for a short time he became draftsman for the Vagn Verkstaderna, Sodertalje, Sweden, designers and builders of railroad cars. In 1901 he returned to the United States and accepted a position as draftsman with the St. Paul Foundry Company, subsequently engaging in similar work with the Great Northern Railway Company. The following year he became draftsman for the Pullman Car Company, with which he remained until 1904. In that year he became connected with the Standard Steel Car Company, of Butler, Pa., as draftsman, and in 1905, when the company first began to build passenger cars, he was promoted to the position of chief draftsman of the passenger car department. Later he was further promoted to the position of chief engineer, and served the company in that capacity up until the time of his death.

Mr. Nordenmalm became a member of the A.S.M.E. in 1927. He also belonged to the Masonic fraternity.

Mr. Nordenmalm married Edith E. Petterson on September 20, 1907, and is survived by her and by an eight-year-old daughter.

John J. O'Connell

John J. O'Connell, assistant hydraulic engineer of the Electric Bond and Share Company, New York, N. Y., died in Rio de Janiero on July 4, 1929. He had been located in Brazil as chief hydraulic engineer for the Emprezas Electricas Brasileiras, S. A., in connection with a new dam which that company is building for the Companhia Energia Electrica da Bahia. This dam, on which construction work has been started since Mr. O'Connell's death, will be the largest of its kind in Brazil. It will be named the "Jerry O'Connell Dam," in honor of Mr. O'Connell, who chose the site and developed the plans for it.

Mr. O'Connell was a lieutenant-colonel in the United States Army Reserves and served in the World War, his duties being chiefly concerned with the production and manufacture of munitions. Early in 1915 he joined the British Munitions Commission, organized to expedite the manufacture and shipment of munitions from the United States. He was commissioned a captain of ordnance in the United State Army in 1917, promoted to major in 1918, and in 1924 was made a lieutenant-colonel in the Reserves.

Mr. O'Connell was born at Emporia, Kansas, on September 11, 1882, the son of Jerry and Mary E. O'Connell. He was graduated from the University of California in 1908 with a degree in mining engineering.

His career was intimately related with the development of the engineering department of the Electric Bond and Share Company. After two years of mining engineering he was employed by an associated company of the Electric Bond and Share Company in July, 1910, in the development of a water-power project in the Pacific Coast. In June, 1912, he was transferred to the engineering department in New York and since that time he had been active in the design of many hydroelectric projects in the United States and abroad and in the investigation and development of the hydroelectric possibilities available for the companies associated with the Electric Bond and Share Company.

After the war his activities were principally in Central and South American countries in connection with the development of properties of subsidiaries of the American and Foreign Power Company, Inc.

Mr. O'Connell was married in New York on December 7, 1928, to Miss Georgia L. Baxter, who survives him.

He became a member of the A.S.M.E. in 1917. He also belonged to the California Club, the Manhassett Yacht Club, and the Army Ordnance Association.

Morris Arthur Pearson

Morris Arthur Pearson was a native of Seymour, Conn., where he was born on September 29, 1882, the son of Richard and Elizabeth (Hill) Pearson. Shortly after completing his work at the Seymour High School, he engaged as a draftsman and designing engineer with the Farrel Foundry & Machine Company, in Ansonia, Conn. Mr. Pearson spent the greater part of the next fourteen years with this company, designing rubber, sugar, and rolling mill machinery. He was then identified for seven years with Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio, as chief engineer, supervising the design and introducing the manufacture of heavy rubber machinery. Subsequently he was with the Allen Machine Company of Erie, Pa., manufacturers of complete equipment for rubber factories, as chief engineer. He was the eastern and export representative of the company with headquarters in New York in 1920 and 1921, after which he became sales manager. During recent years Mr. Pearson was secretary of De Mattea Brothers, Inc., of Clifton, N. J., being with that concern from 1924 until 1928, when a merger was made to form The National Rubber Machinery Company, with general offices in Akron, Ohio. Mr. Pearson was made assistant treasurer of this company with offices in Clifton, N. J.

Mr. Pearson introduced the manufacture of rubber goods machinery in the Middle West and was the inventor of the removable nut holder which is almost universally specified on mill construction by users of rubber machinery. He was a contributor of various articles of interest to publications having to do with the industry, and his advice was frequently sought in matters that concerned the trade.

In recent years Mr. Pearson had designed the complete mill and calendar equipment for many tire and other factories.

Mr. Pearson became an associate member of the A.S.M.E. in 1918. He was also a member of several fraternal organizations, including the Masons, Odd Fellows, and Elks. While living in Seymour from 1907 until 1912 he was a member of the board of education.

Mr. Pearson's death occurred on September 21, 1929, at Ansonia, Conn., following an illness of several months. He is survived by one brother and a sister, William R. Pearson and Miss Ida Louise Pearson, of Seymour.

Samuel W. Powel

Samuel W. Powel, consulting engineer of the American Radiator Company, Buffalo, N. Y., was a Founder Member of the A.S.M.E., having attended the Organization Meeting of the Society held at Stevens Institute of Technology on April 7, 1880. At that time he was connected with the South Boston Iron Company, Boston, Mass. Subsequently he went to Hartford, Conn., where he entered the drawing department of Pratt & Whitney Co., and in 1889 to Hamilton, Ohio, where he was chief draftsman at the Niles Tool Works. He became associated with the American Radiator Company in 1894, and served the company continuously, in various capacities, until his death on December 29, 1929.

Arthur Deudney Pratt

Arthur Deudney Pratt, engineer for the Babcock & Wilcox Co., New York, N. Y., died at Short Hills, N. J., on December 31, 1929. He was born in Brooklyn, N. Y., in October, 1882, the son of Nat W. and Carrie (Deudney) Pratt. He was graduated from Princeton University in 1904 with an A.B. degree and did graduate work at the Massachusetts Institute of Technology

for two years. He began work for the Babcock & Wilcox Co. in 1906, in the Testing Department at Bayonne, N. J. He was transferred to the New York Engineering Department in 1907, and in 1909 to the New York Order Department. In 1911, he returned to the New York Engineering Department, and in 1913 he was made assistant to the advisory engineer of the company.

Mr. Pratt was especially skilful in dealing with the thermal problems involved in boiler design, and was the author and the editor of *Steam* and many of the Company's other publications. He also prepared an article on American Steam Boiler Practice for the Encyclopædia Britannica, and the section on Steam Boilers of Marks' Mechanical Engineers' Handbook. He was the patentee of a very considerable number of inventions in the boiler field, the Reclassified Stirling boiler being one of the most important.

Mr. Pratt became a member of the A.S.M.E. in 1916. He was a member of the Power Test Codes Individual Committee No. 4 on Stationary Steam Generating Units, and took an active part in the work of this Committee, which was instrumental in bringing out the present Test Code for Steam Boilers.

Mr. Pratt is survived by his widow, Dorothea Curtiss Pratt.

Herman F. Priwer

Herman F. Priwer, plant engineer for the Ohio Steel Foundry Company, Lima, Ohio, was killed in an automobile accident on December 26, 1929.

Mr. Priwer was a native of New Bedford, Ohio, where he was born on April 13, 1881. His parents were Otto E. and Augusta (Young) Priwer. Mr. Priwer attended Lima College for one year, and the Case School of Applied Science for two years. For five years (1903-1908) he worked with S. B. Hartman, of Columbus, Ohio, on the construction of buildings and installation of power plants and their equipment. He spent an equal period of time as contracting engineer for isolated power plants and mills, and then became plant engineer for the Kilbourne & Jacobs Mfg. Co., of Columbus, in charge of building, equipment, and power plant, and designing special equipment. His connection with the Ohio Steel Foundry Company began in 1917.

Mr. Priwer had been granted patents on an electric steel melting furnace and an electric furnace safety platform, and designed special equipment for the company. He was a member of the A.S.M.E., which he joined in 1924, and of the National Association of Stationary Engineers, as well as of local civic organizations. He is survived by his widow, Rose (Berry) Priwer, whom he married in 1906, and by three sons.

Grover Cleveland Pruett

Grover Cleveland Pruett, whose death occurred on July 4, 1929, was born at Altus, Ark., on November 11, 1884. He attended the University of Arkansas, from which he received a B.C.E. degree in 1906. During the following summer he was a civil engineer student in the U. S. Office of Public Roads.

While in college Mr. Pruett had devoted his vacations to work in coal mines in Arkansas, and in the fall of 1906 he accepted a position with the Madison Coal & Coke Co., Madison, Pa., as resident engineer. Early in the following year he resigned this position to become connected with the bridge and building department of the C. M. & St. Paul Ry., with which he remained until 1910, serving successively as instrument-man, concrete foreman, and assistant engineer.

From that time until 1923, with the exception of five months during which he served as Captain of Engineers, U. S. Army, during the World War, he was city engineer, superintendent of water works, street commissioner, etc., for Miles City, Mont. He greatly improved the public utilities of the city, and designed and constructed new schools and a new city hall. He also did private work, including the design and construction of water and heating systems and barracks for the War Department at Fort Keogh, Mont., paving, sewer, and irrigation work in Terry, Mont., and vicinity, and a steam laundry, Elks' home, residences, and other buildings in Miles City.

Since 1923 Mr. Pruett had been superintendent of the water and light department of Virginia, Mont.

Mr. Pruett became a member of the A.S.M.E. in 1918. He also belonged to the American Society of Civil Engineers, American Water Works Association, the Masonic fraternity, Elks, Virginia Rotary Club, and other clubs. He is survived by his widow.

John P. Purcell

John P. Purcell, for twenty-seven years connected with the Baldwin Locomotive Works, Philadelphia, Pa., was born in that city on April 17, 1884. He attended the Central High School and then Temple University, where he specialized in mechanical drawing. He served an apprenticeship as machinist with the Baldwin Locomotive Works at Eddystone, Pa., after which he was assigned to the position of assistant foreman of the erecting department. He was promoted through the positions of contractor and foreman to that of assistant superintendent of the erecting department, and at the time of his death, on April 11, 1929, was general erecting foreman.

Mr. Purcell became an associate member of the A.S.M.E. in 1921.

He is survived by his widow, Harriet (Jones) Purcell.

Robert Linn Radcliffe

Robert Linn Radcliffe, until recently manager of the Philadelphia district sales office of the Worthington Pump & Machy. Corp., died on December 13, 1929, following a very brief illness.

Mr. Radcliffe was born September 3, 1879, at Monongahela, Pa. After his graduation from the University of Pittsburgh, he entered the employ of the Westinghouse Manufacturing Company. In 1908, Mr. Radcliffe associated himself with the Fred M. Prescott Company of Milwaukee. Three years later, this company was absorbed by the International Steam Pump Company, then the name of the Worthington Corporation. At that time Mr. Radcliffe was appointed manager of the Atlanta district sales office. Subsequently, Mr. Radcliffe was manager of the sales offices at St. Louis, 1912 to 1919; at Pittsburgh, 1919 to 1923; and at Philadelphia from 1923 until October, 1929.

While manager of the Pittsburgh office, Mr. Radcliffe contracted bronchitis which developed into a very severe illness seriously undermining his health. His physical condition showed so little improvement that a few months before his death he was relieved of the pressing responsibilities as manager of the Philadelphia office, and transferred to the works at Harrison, N. J., where he conducted special work for the general sales department.

Mr. Radcliffe became an associate of the A.S.M.E. in 1915.

Ernest A. Reid

Ernest A. Reid, whose death occurred on May 12, 1929, was born at Beverly, Kansas, on August 14, 1884. After completing his high-school education he engaged in the design and construction of power plants and water works. His first position was in Kansas City, Mo., where he had charge of rebuilding the boiler house at the Turkey Creek Pumping Station in 1904 and 1905. From then until 1911 he was connected with the Missouri Boiler Works Company, in charge of installation of tanks, boilers, and all kinds of miscellaneous steel work.

Since 1911 Mr. Reid had been erecting engineer for the English Brothers Machinery Company, of Kansas City. Among the plants which he designed and built were the power plants for the Pickering Coal Company, Richmond, Mo., and Federal Lead & Zinc Co., Picher, Okla.; refinery for North American Refining Company, Sheffield Station, Kansas City; and the water works plant for City of Richmond, Mo. He also assisted in the design of steam, gas, and electric hoists for the company.

Mr. Reid became a member of the A.S.M.E. in 1924.

Arthur Wells Robinson

Arthur Wells Robinson, inventor and consulting engineer of Upper Melbourne, Quebec, Canada, died at Montreal on May 23, 1929. Mr. Robinson was born at Collingwood, Ontario, on March 28, 1861, the son of Joseph Orr Robinson, solicitor of the Middle Temple, London, who was at that time engaged in legal work in connection with the town site of Collingwood, and of Jane Georgina Buchanan, daughter of James Buchanan, British Consul at New York.

Mr. Robinson was educated at Leamington, England, and at St. Catherines and the Brantford Collegiate, in Ontario. His ability in mechanical invention and design was apparent, and at the age of seventeen he went to Montreal to work as pupil and assistant to John Kennedy, chief engineer to the Harbor Commissioners of Montreal. Here he remained for eight years, assisting in the design, operation, and maintenance of a fleet of forty vessels and dredges used in the St. Lawrence ship channel from Montreal to the sea. Many dredges were rebuilt to increase their efficiency; steel castings, imported from Scotland, were used in dredging machinery for the first time, replacing forgings; large stone grips, and lifting barges, for removing huge boulders from the bed of the St. Lawrence, were designed; the first electric arc lights ever used for harbor purposes were installed; and various other improvements were inaugurated as the result of experimental work carried out by Mr. Robinson and Mr. Kennedy.

After a short time in consulting work in Philadelphia, Mr. Robinson became associated with the Bucyrus Company, of Bucyrus, Ohio, as designer and managing engineer. While there he designed and built the first large dipper dredge, the prototype of many dredges afterwards built on the Great Lakes. In 1892 the company removed to South Milwaukee, Wis., where a new plant, one of the first to use power from an outside power plant, was constructed. Here were developed improved designs of steam shovels, including the large types used in the Lake Superior iron mines. Later the "Atlantic" shovel, a fast wire rope type, was designed by him.

In 1900 Mr. Robinson returned to Canada as consulting engineer to the Department of Public Works of Canada. He designed the hydraulic dredge "J. Israel Tarte," built in 1901 for the St. Lawrence ship channel. This dredge had a rotary cutter for use in clay, which for a time was known as the Robinson cutter. For some years it held the world's record at 757,000 cu. yd. in one month.

From 1900 until his death Mr. Robinson served as consulting engineer for dredging work in rivers and harbors all over the world. He designed several hundred dredges and excavating machines, each for a distinct purpose. Very many patents were taken out in England and the United States, and a still greater number of inventions were left unprotected. He knew little of mathematics and used graphical methods to check his almost unerring instinct for appropriate size and strength of material. The speed and facility with which he designed machinery suitable for each need was remarkable.

Among the projects for which he was engaged were the drainage of the delta of the Nile and the great swamp area of the Sudan, in the upper White Nile region. By the use of special dredges capable of operation in the swamp grasses and papyrus reeds the river was confined to its main channel and the water supply for irrigation purposes in Egypt greatly increased. Mr. Robinson also designed a shallow draft self-propelling dredge for the Niger, to cut through the constantly shifting sands of that river.

The land for Lincoln Park, at Chicago, was largely reclaimed from Lake Michigan by the use of the "Simmons" 30-in. hydraulic dredge, which Mr. Robinson brought out in 1906, and which was a pioneer type on the Great Lakes for dredging stiff clay hydraulically.

The first large dipper dredge of American type built in Scotland was designed for the Port of Bombay, India, in 1912, and in 1924 he designed a steel dipper dredge of 8 cu. yd. capacity which was towed across the Atlantic from Scotland to Nassau, in the Bahama Islands. The following year he was engaged in developing the Diesel electric system as applied to dredges, including a powerful dipper dredge for New York harbor and coast work, and a special type of the Diesel electric dredge for the Sudan Government.

Among other countries which engaged his services were India, China, Japan, Siam, and Burmah. Mr. Robinson had returned only about a month before his death from a five-months' trip to Manchuria, Korea, and Japan, where he inspected twenty-six harbors for which he was to have designed dredging machinery.

Many of the dredges and shovels designed by Mr. Robinson were built by the Atlantic Equipment Company, which was organized in 1903 as a subsidiary of the American Locomotive Company. This company, which continued until 1915, supplied dredges for the Panama, New York State Barge, and Cape Cod Canals, for Egypt and Cuba, and for various public works. During the last twenty years the majority of his dredges for use outside Canada and the United States were built by Messrs. Lobnitz & Co., Renfrew, Scotland, with whom he was associated as consulting engineer.

Mr. Robinson was a life member of the A.S.M.E., which he joined in 1883, and served as a manager of the Society from 1896 to 1898. He also belonged to the American Society of Civil Engineers, Institution of Civil Engineers, and the Engineering Institute of Canada. He contributed many papers to these societies on dredging and dredging machinery and their relation to ocean transportation.

Outside of these activities Mr. Robinson devoted much time to landscape gardening, photography, and music, which were the forms of recreation he most enjoyed. His widow, Margaret Robinson, a daughter of the late T. M. Taylor, of Montreal, and one son, Francis E. M., survive him.

Edward Robinson

Edward Robinson, head of the department of mechanical engineering of the college of engineering of the University of Vermont, was fatally injured on August 2, 1929, in Thomaston, Me., when he stepped from behind a parked automobile into the path of another machine. He died several hours later at a Thomaston hospital.

For twenty-seven years Professor Robinson had been at the head of the department of mechanical engineering at the University of Vermont, going there from Clarkson Institute at Potsdam, N. Y., in 1902.

He was born in Vineland, N. J., December 23, 1865, the son of Frederic A. and Mary A. (Barnard) Robinson. He was educated in the Thomaston High School, graduating in 1883. He attended Massachusetts Institute of Technology, graduating with a degree of bachelor of science in mechanical engineering in 1890.

He was assistant for one year in the laboratory of the Institute and in 1891 he became assistant superintendent of the Hartford Cycle Company of Hartford, Conn., staying with that company for one year. He returned to the Institute as assistant instructor in drawing and descriptive geometry and occupied that position for four years. In 1896 he was appointed professor of mechanical engineering at Clarkson Institute of Technology at Potsdam, N. Y., and remained there for six years.

In 1902 he married Clara E. Schouten of Brockport, N. Y., by whom he is survived. He also leaves one son, Edward Schouten Robinson, who is a graduate student in philosophy at Harvard.

The following excerpts from resolutions adopted by the faculty of the college show his relations to the University and to the engineering profession:

"In his death, the University loses one who for twenty-seven years has served the institution with fidelity and efficiency. His primary interest was in his classroom work, in which he won the respect and good-will of his students, and the experience in his classes is held in grateful and joyful remembrance by a large body of alumni, whose subsequent careers he watched with unfailing interest. But nothing pertaining to the welfare of the University was alien to him. To educational policies he gave serious thought, and he accepted cheerfully his share of administrative assignment and brought to the discharge of the duties involved an excellent judgment and an unselfish spirit. In him the students found a wise, considerate, and tolerant adviser. His activities in the Student Council, of which he was an influential member for many years, will be long remembered. To him his assistants and his students were all friends.

"The engineering profession loses a devoted and enthusiastic member. His interests were not restricted to the scientific and technical side of engineering but extended to the broader economic and humanitarian aspects and possibilities. He was an early and zealous advocate of F. W. Taylor's idea of scientific management, and was one of the first to introduce the system into the curriculum. He was a regular attendant and active participant at the meetings of the A.S.M.E. (which he joined in 1891), the Taylor Society, the Society for the Promotion of Engineering Education, and the Vermont Society of Engineers, of which he was also an ex-president."

John Graw Rock

John Graw Rock, whose death occurred on February 22, 1929, was born in Oslo, Norway, on March 11, 1868, the son of Whilhelmine Whilhelmsen and John Graw Rock. He secured his public school and early technical education in Trondhjem, Norway, and also studied machine design in Munich, Germany. He served an apprenticeship with Julius Gallus, a surgical instrument manufacturer in Oslo, after which he became foreman and superintendent for Wisbech & Meinich, Oslo, and subsequently part owner and shop manager of a mechanical and electrical manufacturing concern, of Oslo and Fredrikstad. During the last year of his stay in Norway he was engaged in the design and manufacture of marine engines for commercial and pleasure use, as superintendent and machine designer of the Levahn Motor Company, of Oslo.

After Mr. Rock came to the United States he spent two years as master mechanic and designer for G. O. Reynolds, Inc., of New Rochelle, N. Y. In 1913 he organized the John G. Rock & Co., and later the Volute Spring Shock Absorber Company, of New Rochelle and Mt. Vernon, and manufactured his invention, the "Rex" automobile shock absorber. Because of financial reverses he was forced to abandon this business in 1915 and during the remainder of the World War he was associated with the American Machine & Foundry Co., in Brooklyn, N. Y. In 1920 he accepted a position as machine designer in charge of the experimental department of the Ward Leonard Electric Company, of Mt. Vernon, and at the time of his death had been advanced to the position of mechanical engineer for the firm.

Mr. Rock was the author of a reference book for engineers and mechanics, which was published in Norway in 1909. Among his inventions and designs, in addition to the shock absorber for automobiles, were safety doors for street and railway cars, safety stop devices for railway cars, a safety clutch for factory shaftings, automatic grease cups for loose pulleys, a non-explosive kerosene stove, an internal-combustion turbine, a reversing timer for gasoline motors, the double volute spring, a thread and milling machine, tool holders, a machine lap for taper holes, a shutter for moving picture machines, and various parts for electric batteries, gasoline and kerosene motors, carburetors, timers, wire bending and spring winding machines, and different tools.

Mr. Rock became a member of the A.S.M.E. in 1927.

William Arthur Rockliff

William Arthur Rockliff, president and consulting mechanical engineer of Bennetts Ltd., Nelson, B. C., Canada, died in Nelson on October 13, 1929. He had been an associate-member of the Society since 1921.

Mr. Rockliff was a native of Mobile, Ala., where he was born on February 14, 1867, the son of William Arthur and Elizabeth Anne (Douglas) Rockliff. After leaving school he served a four-year apprenticeship to the machinists' trade, upon the completion of which he worked for several years as journeyman machinist. In 1890 he became master mechanic for the Granite Mountain Mining Company, Granite, Mont., where he remained for three years, in charge of several stamp mills and the mechanical equipment of the mines. As construction engineer during the next two years for the Golden Sunlight Mining Company, he supervised the erection of their plant at Whitehall, Mont., including an ore concentrating plant of 500-tons capacity. He then worked for a year for the Montana Ore Purchasing Company, as draftsman and designer in connection with the erection of a new ore concentrator and copper smelter.

From 1899 to 1901 Mr. Rockliff was master mechanic for the Boston & Montana Mining Company, in full charge of all the machinery at its eight mines, which employed 1400 men. Subsequently he was construction engineer for the Bingham Con Smelter, Midvale, Utah, during additions and changes to its copper smelting plant, work which involved the design of equipment for boring out cylinders and valve chambers, piston rings, discharge valves, and other improvements for steam and air cylinders.

While working as constructing and erecting engineer for the Allis-Chalmers Mfg. Co., of Milwaukee, Wis., Mr. Rockliff erected steam engines and turbines, hydraulic turbines and generators, and industrial plants including a twenty-stamp combination amalgamation and cyanide gold milling plant for the Dolores Mines Company, at Dolores, Chihuahua, Mexico, in 1906. Later he also erected the P. R. R. Company's timber preserving plant at Greenwich Point, Philadelphia, Pa., for the Allis-Chalmers Mfg. Co.

For two years (1908-1910), Mr. Rockliff was located at Copperhill, Tenn., acting as construction engineer and master mechanic for the Tennessee Copper Company. His duties included the first unit of their sulphuric acid plant, the remodelling of all the blast furnaces to adapt them for furnishing gas for the acid plant, and the changing of their copper converters from hydraulic to electric drive. The following year he spent as draftsman for the Salt Lake Engineering Company, at Salt Lake City, Utah, designing special machinery, and then for a period of three years he did contracting work which included installation of irrigation works and power plant machinery. Prior to his connection with Bennetts Ltd., Mr. Rockliff was superintendent of construction and master mechanic for the American Trona Corporation, in San Bernardino County, Calif.

Mr. Rockliff is survived by his widow, formerly Mabel Elizabeth Bennett, whom he married in 1916.

Charles H. Sammons

Charles H. Sammons, who died in Richmond Hill, L. I., N. Y., on July 19, 1929, after a long illness, was born in New York, N. Y., on October 27, 1859, the son of Hiram and Serena G. Sammons. His engineering experience began in 1880 with the A. M. Dolph Co., of New York, which he served as shipping clerk, master mechanic, and superintendent of construction, and for which he designed and constructed about forty steam laundries. He was with this company for ten years.

From 1890 until his retirement Mr. Sammons engaged in contracting and engineering salemanship. He was connected with the Stirling Boiler Company, New York, from 1894 to 1897; the Morrin Climax Boiler Company, New York, from 1898 to 1899; the American Smelting & Refining Co., Perth Amboy, N. J., from 1917 to 1918; and the Drake Non-Clinkering Furnace Block Co., Inc., New York, after 1921. His contracting work included a steel stack for the Ridgewood Pumping Station, power house and machinery for the N. J. Reclaiming Co., Newark, N. J., power equipment for the C. H. O'Neil Lumber Co., New York, two steel stacks for the Jewell Milling Company, and a number of buildings in New York.

Mr. Sammons became an associate of the A.S.M.E. in 1921. He was an active member of the Masonic fraternity, held office in the Order of United American Mechanics and the Independent Order of Foresters, and took a prominent part in civic affairs in Richmond Hill, being treasurer of the Richmond Hill Civic Association, and organizer and trustee of the Richmond Hill Democratic Club.

Surviving Mr. Sammons are his widow, Annie E. (Bond) Sammons, and one son, F. Elmer Sammons. He had hoped to live to celebrate their fiftieth wedding anniversary in 1930.

William J. Schatz

William J. Schatz, son of William and Kathleen Schatz, died of cerebral hemorrhage at his home in New York, N. Y., on November 18, 1929. He was born in that city on May 10, 1876, and attended public schools there. After completing his high school course he worked for eighteen months as erecting engineer for the Watertown Engine Company. He then spent two years with

the Third Ave. R. R. Co., as first assistant engineer at the Kingsbridge Power House, three years as directing engineer for the Dearborn Drug & Chemical Co., and two years at the Pennsylvania Power House in Long Island City. Here he held the position of general foreman and chief engineer of operation for the Westinghouse, Church, Kerr & Co., and had entire charge of the installation of turbines, boilers, stokers, economizers, and auxiliaries, and then was chief engineer of the plant until it was turned over to the Pennsylvania R. R. operators.

Mr. Schatz's next connection was with the Platt & Washburn Refining Co., as lubrication engineer, and subsequently he held a similar position with the Swan & Finch Co. In 1922 he resigned this position to go into business with his brother, and until his death was engaged with him in the operation of the Federal Garage on Carter Avenue, in New York, holding the positions of president and general manager of Schatz Brothers.

Surviving Mr. Schatz are his widow, Dora (Miller) Schatz, whom he married in 1918, their two children, Dorothy and James, and two children by a former marriage, Gertrude and William. He had been an associate of the A.S.M.E. since 1916.

Philip John Schneider

Philip John Schneider, manager and part owner of the American Tool & Mfg. Co., Urbana, Ohio, was born at Springfield, Ohio, on March 11, 1881, the son of George and Dorathea (Lohmeier) Schneider. He attended the Springfield High School and Y.M.C.A. night school and served an apprenticeship as machinist with the Springfield Machine Tool Company, and Owen Machine Tool Company, both of Springfield.

In 1902 Mr. Schneider entered the employ of the Robbins & Myers Co., in Springfield. He assisted in developing the first oscillating fan manufactured by this company, and for two years carried on experimental work on motors, fans, and the Universal grinder. After four years with this company Mr. Schneider took charge of experimental work and manufacturing for the Select Telephone Company of Springfield, and when this company was merged in 1908 with the Telephone Company of Rochester, N. Y., into the American Automatic Telephone Company, at Urbana, Ohio, he became foreman of the machine shop of the new plant. Later he was promoted to the position of superintendent in complete charge of the design and manufacture of calling and central exchange switch devices for automatic systems, and the development of equipment for manufacturing such devices.

Mr. Schneider resigned this position in 1914 and formed a partnership with H. P. Creighton under the name of the American Tool & Mfg. Co., for designing and building tools, dies, jigs, and fixtures. He was manager of this business until his death on May 31, 1929, from heart disease.

Mr. Schneider became a member of the A.S.M.E. in 1921. He also was an active member of the Masonic fraternity, in which he was a Knight Templar, and of the Lutheran Church, and was deeply interested in all movements pertaining to the welfare and development of boys.

He is survived by his widow, Edith P. (Kloepfer) Schneider, one daughter, Mrs. E. D. Kirby, and four sons, Paul K., Earl P., John G., and Hugh A. Schneider.

Charles Edwin Search

Charles Edwin Search, retired general works manager of the West Allis plant of the Allis-Chalmers Mfg. Co., West Allis, Wis., died of influenza at St. Petersburg, Florida, on January 10, 1929. Ill health forced him to resign his position in 1924, and since that time he had spent his summers at Black Oak Lake in Northern Wisconsin, and his winters in Florida.

Mr. Search was born in Milwaukee, Wis., on June 19, 1867, the son of William and Catherine A. (Langly) Search. The death of his father compelled him to leave school and go to work at an early age. Before he was fifteen years old he had worked as cash boy in a dry goods store, in type, brass, and iron foundries, and in a sash and door factory. He then became a machinist's apprentice at the Allis plant of the old Allis Company. With the exception of a short period when he was rebuilding the plant of the Niles-Bement-Pond

Company, he was associated with the Allis-Chalmers Mfg. Co. and its predecessors for more than forty years.

Mr. Search supplemented his technical training at the Allis plant with evening study in various lines. After completing his apprenticeship and working as a journeyman for a time he was promoted to the position of machine shop foreman. He introduced the first automatic machinery used in the old Clinton Street plant of the company, and modern methods and systems. His progressiveness attracted the attention of Mr. Edwin Reynolds, who assigned to him the duties of what is now known as efficiency and industrial engineering. He gave Mr. Search a free hand to apply his knowledge and ability in all departments of the old Reliance Works.

When the erection of the West Allis plant was begun, Mr. Search was sent to Europe to study similar plants and their equipment. The ideas thus obtained were useful not only in the initial building and equipment of the West Allis plant but also later in closing up and moving to West Allis the Scranton, Gates, Frasers & Chalmers, and Reliance Works.

Mr. Search was of great service to the company in establishing insulation, standardization, and other departments, as chairman of development, inventory, and materials committees, in the appraisal of properties and products, and particularly during the World War in the erection of buildings, designing of machinery, and organization of departments for manufacturing destroyer turbines, shells, forgings, etc. He gave considerable personal attention to the working conditions in the shops and to the general welfare of the employees of the company.

Mr. Search was a director of the First National Bank of West Allis, and active in the Masonic fraternity, in which he held 32d degree. He became a member of the A.S.M.E. in 1906. His widow, formerly Olive M. Mahoney, whom he married in 1896, survives him.

Osborn Parker Sells

Osborn Parker Sells, formerly sales engineer for the Double Seal Ring Company, New York, N. Y., died on April 15, 1929. He was born at Bloomington, McClean County, Ill., on May 13, 1867, and after attending the public schools and business college, secured technical training through private tutorage and home study. He gained his early drawing-room and shop experience with the Thomson-Houston Company, the United Edison Manufacturing Company, and the Edison General Electric Company.

His specialty was electrical and mechanical design and the equipment of power plants. In 1892 he built two plants for the Barnett & Record Co., one at Gladstone, Mich., and the other at Shorham, Minn. In the spring of the following year he designed and built a plant for the Chicago Beach Hotel, and during the next few months was engaged in the design and construction of plants for the Cornish Electric Company.

Mr. Sells went to New Orleans in the fall of 1893 and spent the next four years there designing and constructing plants. Late in 1897 he went to New York, where he remodelled the Windsor Hotel, and subsequently drew up plans and specifications for a power plant for the Raritan Copper Works, built the plant, and operated it until July, 1901. He then entered the employ of the Pueblo Traction & Lighting Co., for which he remodelled the power plant and installed new machinery.

From 1902 to 1908 he was president of the Sterling Public Service Company. Mr. Sells, who first joined the A.S.M.E. in 1902, withdrew from membership from 1908 until 1920, and no record of his activities during that period are available. At the time of his death he was a member of the firm of O. P. Sells & Co., New York, N. Y.

His widow, Louise (Shahan) Sells, of Kearney, Neb., survived him by little more than a year. There were no children.

Ralph Crysler Seymour

Ralph Crysler Seymour was born on February 11, 1861, at Ogdensburg, N. Y., the son of Isaac L. and Mary (Crysler) Seymour. He was educated in public and

private schools and entered Cornell University in the mechanical engineering course in 1880. In his junior year he left college and began his long and successful experience in the field of inventing and designing printing and allied machinery, his first connection being with the Bullock Printing Press Company of Philadelphia.

In 1890, Mr. Seymour organized the Seymour-Brewer Printing Press Company of Chicago, which afterwards became the Ostrander-Seymour Company, and brought out a new type of rotary newspaper web press. Here also he had his early experience in color presses. Later he associated himself with the C. B. Cottrell & Sons Company, of Westerly, R. I., builders of magazine and color rotaries. In 1907 he became connected with the Goss Printing Press Company of Chicago, which was prominent in the field of printing machinery. For an interval from 1910 to 1912 Mr. Seymour was engineer for R. Hoe & Co., Inc., of New York, and then returned to the Gross Company as manager of their New York office and head of the rotary magazine press department until 1920. In that year he was instrumental in organizing the Schwartz-Seymour Company, Inc., and as chief engineer and general manager brought out an advanced type of rotary web fed magazine press, many of which are in operation today. In 1926, however, he again joined with R. Hoe & Co., Inc., as their designing and supervising engineer, and was very active in the magazine press department of their organization at the time of his death, which occurred on May 28, 1929.

In his professional career Mr. Seymour designed and constructed a great variety of printing press and allied machinery and was the parent of many valuable patents in the industry.

Mr. Seymour took much pleasure in yachting, and was a member of the yacht club at Larchmont, N. Y., where he lived for a number of years. He was particularly interested in high speed motor boating, and followed this sport at his summer home in the Thousand Islands. His intensive interest in engineering was substantiated by the maintenance of a completely equipped machine shop at his home at Short Hills, N. J., where he had resided for several years prior to his death.

Surviving Mr. Seymour are his widow, Mary Frances (Haff) Seymour, whom he married in 1902, a son, Ralph de Villers Seymour, and a daughter, Frances Seymour.

Mr. Seymour became a member of the A.S.M.E. in 1914.

David Shirrell

David Shirrell was born in Thompsonville, Conn., on September 15, 1848, and died in Schenectady, N. Y., on January 18, 1929. He was the son of James and Elizabeth (McComb) Shirrell, natives of Scotland and Ireland, respectively. After a common school education, which he supplemented by diligent reading, he became an apprentice machinist in Hartford. He followed that trade only long enough to become apprentice draftsman at the Grant Locomotive Works at Paterson, N. J., under the late J. G. A. Meyer.

Mr. Shirrell completed his apprenticeship about 1877 and worked in the neighborhood of Paterson and New York until 1899, when he went to the Richmond Locomotive Works as chief draftsman and remained there until 1903. He then accepted a position as chief engineer for the Montreal Locomotive Works. After this plant was taken over by the American Locomotive Works he was transferred to its Schenectady plant, in 1905, and remained there until his retirement in 1927.

In addition to educational reading Mr. Shirrell spent much of his leisure time in working out mathematical problems, and in his later years took a considerable interest in floral horticulture. He had been a member of the A.S.M.E. since 1890.

Charles Porter Smith

Charles Porter Smith was born in Cambridge, Mass., on April 17, 1866, the son of Huntington Porter and Anna (Berry) Smith. He was educated in the public schols of Cambridge, and at Massachusetts Institute of Technology, from which he was graduated in 1887 with an S.B. degree.

Immediately after graduation Mr. Smith served an apprenticeship as a machinist with C. B. Rogers & Co., Norwich, Conn., and worked as chief draftsman and designer of woodworking machinery for this company until 1891. During the next three years he was connected with the Thomson-Houston Electric Company and General Electric Company at Lynn, Mass., and Schenectady, N. Y. In 1894 he accepted a position with the Morgan Engineering Company, Alliance, Ohio, as draftsman and designer of electric motors and controllers for travelling cranes. He had been there only a short time when the Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa., offered him a similar position, which he accepted. He remained with the company for nearly ten years, several of which he spent at the works in Havre, France.

In 1905, after a short period as engineering expert for the National Board of Fire Underwriters, New York, Mr. Smith returned to the Lynn works of the General Electric Company, where he remained for five years, designing motors and turbo-generators and computing the strength of materials. Poor health in 1910 led him to accept less strenuous duties with the Pacific Mills, in Lawrence, Mass., where he remained as master mechanic until his retirement from business in January, 1926. His death occurred on July 14, 1929.

Since his retirement Mr. Smith had been active in community affairs, particularly in connection with the Special Water Committee of Methuen, Mass., to secure a new water supply for the town.

Mr. Smith became a junior member of the Society in 1888 and was promoted to full membership in 1925. He was married in 1896 to Jessie Bell McEwen, who, with two sons and one daughter, survive him.

Edwin K. Smith

Edwin K. Smith, chief mechanical engineer of the Great Western Laundry Company, Chicago, Ill., died on May 16, 1929.

Mr. Smith was born at Aaronsburg, Pa., on January 25, 1880, the son of Samuel C. and Susan Krape Smith. He attended the Spring Mills Academy and Pennsylvania State College, after completing his high school education. His first employment was in connection with the installation of an ice and cold storage plant at Johnstown, Pa., in 1903 and 1904. He then spent a short time as master mechanic for the Sears Brothers, at Hart, Mich., after which he was located until 1910 at Grand Rapids, Mich., engaged in the construction of cheese plants and creameries.

From 1910 to 1919 Mr. Smith was chiefly engaged in the building or rebuilding of packing plants. His work took him to Forestville, N. Y., in 1910 and 1911; Petrolia, Ontario, as superintendent and chief engineer of the Lambton Packing Company, during the next four years; and successively to Grand Junction, Colo., Ogden, Utah, Arkansas City, Kan., Penrose, Colo., and Luzerne, Pa.

From 1919 to 1921 he was chief engineer for the Armour Leather Company, and during the following two years master mechanic of the boiler and blacksmith shops and power house of the Vulcan Iron Works at Wilkes-Barre, Pa. Subsequently he served the Pennsylvania Public System as master mechanic for a year, spent another year in reclaiming the old machinery at the Edwardsport, Ind., power plant, and was for a time chief engineer of the Hayes Hotel and Annex, at Chicago.

During the last few years of his life he also devoted some time to inventions for the automatic control of temperature in buildings.

Mr. Smith became an associate-member of the A.S.M.E. in 1926, and also belonged to the Western Society of Engineers, Penn State Society of Chicago, and the Masonic fraternity. He is survived by his widow, Sarah C. Smith, whom he married in 1901, and by one son, Andrew J. Smith.

Paul Garton Stanley

Paul Garton Stanley, pilot officer of the Royal Canadian Air Force, Camp Borden, Canada, was killed on November 4, 1929, when he is believed to have lost control of a machine which he was testing at Montreal. A very thick cloud through which he was obliged to descend may have caused the accident.

Mr. Stanley was born in Toronto, Canada, on April 2, 1906. He attended Oakwood Collegiate Institute and was graduated with honors in mechanical engineering from the University of Toronto in 1927. Prior to his connection with the Air Force he had been a demonstrator in the machine design laboratory and research assistant in the aerodynamic laboratory at the University of Toronto.

Mr. Stanley became a junior member of the A.S.M.E. in 1928. He was also a member of the Royal Aeronautical Society.

John Amos Stevens

John Amos Stevens, consulting engineer specializing in light, heat, and power, honorary chairman of the A.S.M.E. Boiler Code Committee, died at the age of 61 at his home in Lowell, Mass., on November 18, 1929, after a long illness.

Born in Galva, Ill., on September 16, 1868, the son of George M. and Georgeanna Ames Stevens, Mr. Stevens received his education in the public schools, the Saginaw (Michigan) High School, and the University of Michigan, which latter he attended for one year. For three years he was an apprentice machinist in the shops of Mitts & Merrill, Saginaw, and for one year an assistant toolmaker with the Pere Marquette Railroad.

Mr. Stevens then turned to marine steam engineering on the Great Lakes. In 1893 he came East and entered the employ of the International Navigation Company of New York, under whom, in three years, he became first assistant engineer of the *St. Paul,* then one of the finest transatlantic liners. At the age of 27 he obtained an unlimited engineer's license for ocean steamships.

In 1896 Mr. Stevens became chief engineer of the Merrimac Manufacturing Company, of Lowell, Mass., a position which he held for 13 years. During this time he practically redesigned the steam plant at Lowell, and superintended the design and construction of the power plants of the company's southern mills.

After a three months' study of steam boilers, turbines, and condensers in Europe, Mr. Stevens resigned his position with the Merrimac Company in 1909 and opened an office as a consulting engineer. He was granted a number of patents on steam boilers, superheaters, and shock-absorbing devices.

In 1911 Mr. Stevens was appointed chairman of the Boiler Code Committee of The American Society of Mechanical Engineers, a position which he held until 1925, when he was made honorary chairman. He was a member of the original Massachusetts Board of Boiler Rules, on which he represented the "boiling-using" interests. He continued his membership on this Board for a number of years, and was active in the compilation and publication of the rules for the manufacture and inspection of stationary steam boilers in Massachusetts issued by the Board of 1909.

Mr. Stevens created a trust fund under the auspices of The American Society of Mechanical Engineers, known as the John A. Stevens Trust Fund. The principal of this fund amounts to $24,000, the income of which is to be paid annually, after 1932, to Mr. Stevens' two sons during their lives, after which it reverts to the A.S.M.E. forever to establish an award to persons who have in any year made or been responsible for an invention in engineering having to do with progress in the conservation of fuels in the generation of light, heat, and power.

During the World War Mr. Stevens was standardization engineer of the United States Shipping Board, Emergency Fleet Corporation, and as such assisted in formulating "Allowances, Tolerances and Clearances of Marine Machinery and Its Inspection." In 1916 the National Association of Cotton Manufacturers presented to Mr. Stevens its Association Medal for his paper on the "Evolution of the Steam Turbine in the Textile Industry," and for having contributed the most to the advancement of the cotton industry during the year 1917.

Mr. Stevens became a member of the A.S.M.E. in 1902, was manager from 1915 to 1918, and vice-president during the years 1918-1920. He was also a member of the American Society of Heating and Ventilating Engineers, the American Society for Testing Materials, the Society of Naval Architects and Marine Engineers, the National Association of Cotton Manufacturers, the

Lowell Board of Trade, the High School Building Commission of Lowell, the Boston Chamber of Commerce, the Old Colony Club of New York, the Engineers' Club of Boston, the Yorick Club of Lowell, and the Vesper Country Club of Tyngsboro, Mass.

Mr. Stevens was a loyal member of the A.S.M.E. Notwithstanding the immense amount of work he did as chairman of the Boiler Code Committee, he felt that the Society was such a great benefit to him that he owed a debt to the organization rather than it owed anything to him. His creation of the trust fund shows the high esteem in which he held the Society.

When the work of the Boiler Code Committee was started it was viewed by many with suspicion. Mr. Stevens worked on unflinchingly in spite of aspersion which were cast by some on the activities of his Committee, and won out through steadfastness of purpose, impartiality, and an honesty of effort which was apparent to all. He was a pillar of strength in the early days of the Boiler Code Committee, and was the master builder of the present firm structure which will serve as a living monument to perpetuate his endeavors.

Mr. Stevens was married at Saginaw, Mich., October 7, 1896, to Luella E. Holland. His wife and two sons, Holland A. and Richard A., survive him.

William J. Stoop

William J. Stoop, a resident of Pittsburgh for many years, and prominent in the steel industry of the district, died on October 23, 1929, at his home at Morewood Gardens after an illness of several months.

Mr. Stoop was born at Wellsville, Ohio, on July 11, 1868. His parents were William J. and Mary M. (Snyder) Stoop. After completing his work at the Pittsburgh High School Mr. Stoop served an apprenticeship as a machinist with the H. K. Porter Locomotive Works, Pittsburgh, and for a number of years worked at his trade in shops in that vicinity. He worked his way up, first to the general superintendency of McIntosh Hemphill & Co. He became later, in succession, master mechanic of the Sharon Iron Company and Buhl Steel Company, Sharon, Pa.; general superintendent of Struthers-Wells & Co., Warren, Pa.; general superintendent of the Mesta Machine Company, Pittsburgh; general superintendent of the North Carnegie Works, Sharon; superintendent of the slabbing and plate mills of the Lackawanna Steel Company, Buffalo, N. Y.; general superintendent of the Milliken Bros. Steel Co., Staten Island, N. Y.; superintendent of the Mesta Machine Company; general superintendent of the Portsmouth, Ohio, plant of the Wheeling Steel Corporation; vice-president and general manager of the Treadwell Engine Company, Easton, Pa.; manager of the Whitaker-Glessner Co., Beach Bottom Works, Wheeling, W. Va.; vice-president in charge of operation of the Wheeling Steel Corporation; and general manager of the Morgan Engineering Company, Alliance, Ohio. He had retired at the time of his death.

Mr. Stoop is survived by his widow, Mrs. Leah A. (Walker) Stoop, whom he married in 1905, and by one son, William J. Stoop, Jr., both of Morewood Gardens.

Mr. Stoop was a member of the Iron and Steel Institute and the A.S.M.E., which he joined in 1915.

William Oscar Strauss

William Oscar Strauss, director and works manager of The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio, died at the Petoskey Hospital, Petoskey, Mich., on August 18, 1929, following an emergency operation for appendicitis.

Mr. Strauss was born at Columbus, Miss., on August 9, 1889. After a special course at the Ohio Mechanics Institute, he served an apprenticeship with the Lane & Bodley Co., engine builders of Cincinnati, Ohio, and spent a year as designer of gas engines with Illmer & Co., of that city. From 1907 to 1910 he was connected with The R. K. LeBlond Machine Tool Co., and after a year each with the Cincinnati Milling Machine Company and the Hooven-Owens Rentschler Co., at Hamilton, Ohio, he returned to the LeBlond Company, in which he rose to the position which he occupied at the time of his death.

Mr. Strauss became an associate member of the Society in 1914 and was promoted to full membership in 1922.

Charles Emile Bernadott Sylvain

Charles Emile Bernadott Sylvain, textile engineer for the International Machinery Company, Rio de Janeiro, Brazil, S. A., died at São Paulo in August, 1929.

Mr. Sylvain was born at Manchester, N. H., on September 24, 1888. After three years with the Stark Mills at Manchester, he attended the Lowell Textile School from 1910 to 1913, studying textile engineering, and also did special power and lighting work at the Boott Mills, in Lowell.

Prior to his connection with the International Machinery Company in 1917 he had had experience with the Green Fuel Economizer Co., Boston, Mass., on mechanical draft and economizer layouts and cost calculations; Ludlow Associates, Ludlow, Mass., on locomotive boiler coal and turbine tests, hydroelectric layouts, time studies, experimental work on fiber mixtures, and moisture and strength tests of manufactured products; Chelsea Fiber Mills, Brooklyn, N. Y., experimental work on fiber mixtures and chemical treatment of fibers; and W. R. Grace & Co., New York, N. Y., purchasing textile machinery for export.

Mr. Sylvain became an associate member of the A.S.M.E. in 1920.

John Christopher Taliaferro

John Christopher Taliaferro, formerly member of the executive committee and director of the Continental Can Company, Baltimore, Md., died at his home in Guilford, Md., on February 10, 1929, of pneumonia.

Mr. Taliaferro was born at Gloucester, Va., on January 28, 1859, the son of Robert Brooke and Francis Gilmor (Jones) Taliaferro. He attended the Mechanics Institute, at Richmond, Va. His first position was with the Trediger Iron Works, Richmond, for which he was manager in charge of the rolling mills and steam forge work from 1880 to 1890. During the next five years he held a similar position with the Richmond Standard Spike & Iron Co. In 1895 he superintended the construction of a plant in Baltimore for the Norton Brothers Tin Plate & Can Co., and he managed the plant until it was sold to the American Can Company in 1902. He then became chief engineer and manager of the eastern division of the latter organization, and later helped to organize the Continental Can Company. Although he retired from active participation in the business about three years before his death, he had retained an office at the company's headquarters and took a keen interest in its activities.

Mr. Taliaferro invented a tin-plate cleaning machine used exclusively in all plants manufacturing tin plates, and held many other patents in metal-working machinery.

In addition to his business connections, Mr. Taliaferro was director of the National Bank of Baltimore, the Century Trust Company, the Calvert Bank, and the old Alabama Company of that city. He became a member of the A.S.M.E. in 1918, and was a member of the vestry of the Christ Protestant Episcopal Church and of several clubs.

Mr. Taliaferro married Austina Brockenbrough of Richmond, Va., in 1889, and is survived by her and by two sons and two married daughters.

William H. Thiemer

William H. Thiemer, chief engineer, Almetal Universal Drive Shaft Co., Cleveland, Ohio, was born in that city on July 1, 1875. Supplementing his public school education he took courses through the International Correspondence Schools. After training as a machinist in general shop work he was employed successively by Horsburg & Scott, 1888; Globe Iron Works, 1892; Brown Hoisting & Machinery Co., 1893; Cleveland Punch & Shear, 1896; Kilby Mfg. Co., 1898; Winton Motor Carriage (later known as Winton Motor

Car Co. and The Winton Company), 1903; Peters Mch. & Mfg. Co., 1919; The Universal Drive Shaft Company, of which he was vice-president, 1922. He became connected with the Almetal company in 1927.

Mr. Thiemer became a member of the A.S.M.E. in 1911. His death occurred on December 22, 1929.

Mr. Thiemer designed single and double broach machines, gear chamfering machines, automobile radiator fins, and punch and loading machines.

Fielder W. Thomas

Fielder W. Thomas, sales engineer and estimator for the Burke Engineering Company, in its Cleveland, Ohio, office, was born at Bridgeport, Conn., on May 23, 1867. He attended Franklin Institute for two years and served an apprenticeship in the testing room of the Edison Machine Works at Schenectady, N. Y. From 1888 to 1891 he served successively as wireman, lineman, station man, and foreman with the North American Construction Company, of Pittsburgh, Pa. He was connected for a short time with the Thomson-Houston Company, Cleveland, Ohio, and Commercial Electric Company, Detroit, Mich., and then spent three years as assistant engineer for the D. & C. Steam Navigation Co., of Detroit, on the steamer *City of Mackinac*.

During the years 1895-1898 Mr. Thomas engaged in central station construction work in the State of Michigan, with headquarters at Detroit. He next accepted a position as foreman for the Washtenaw Light, Heat & Power Co., of Ypsilanti and Ann Arbor, Mich., later being promoted to the position of superintendent, and remaining with the company until 1902. In that year he became associated with Westinghouse, Church, Kerr & Co., in New York, as superintendent of construction. After eight years there he went to Huntington, W. Va., as electrical engineer on the West Virginia General Division of the Chesapeake & Ohio R. R.

Mr. Thomas was employed from 1912 to 1915 by consulting engineers of Cincinnati, Ohio, and did general consulting and construction work in steam and electric power stations and industrial plants. He was connected for a time with the Globe-Wernicke Company, as efficiency engineer at its Norwood, Ohio, plant.

In 1915-1916 he was appraisal engineer on the staff of the Ohio State Public Utilities Commission, and during the following year was connected with The Frazier Sheal Company, consulting engineers of Cleveland. During the next few years he was mechanical engineer successively for the Otis Steel Company and H. K. Ferguson Company of Cleveland, and Firestone Tire & Rubber Co., Akron, Ohio. In 1924 he served as heating and ventilating engineer in the Division of Architecture of the Board of Education of Cleveland, and he practiced as a consulting engineer in the field of heating and ventilation during the following years.

Mr. Thomas became a member of the A.S.M.E. in 1920 and was also a member of the Cleveland Engineering Society.

Charles J. Thompson

Charles J. Thompson, president of the C. J. Thompson Co., Long Island City, N. Y., and formerly mechanical engineer engaged in the construction of the Panama Canal, committed suicide in Panama City on August 16, 1929. It was presumed that his act was motivated by the fact that he was at the end of his financial resources. He is survived by his widow and two sons, who had been with him in Panama for about six months.

Mr. Thompson was born at Crestline, Ohio, in January, 1873. He served an apprenticeship with the Bucyrus Foundry & Mfg. Co., Bucyrus, Ohio, from 1888 to 1894, and at the same time took a course in drafting. During the next five years he supervised the erection of machine tools for the Niles Tool Works, Hamilton, Ohio. In 1900 Mr. Thompson accepted a position as manager for the A. J. Beckley Co., Garwood, N. J. He had charge of manufacturing, sales, purchasing, and costs, and designed dies, jigs, fixtures, and special sand and stone screens.

It was in 1905 that Mr. Thompson first went to Panama. He was in charge of work in the Chagres Division, and was particularly engaged in the erection of steam shovels and the perfection of their design. After five years

in this work Mr. Thompson became mechanical engineer for the Northern Railway, in Costa Rica, for which he installed new machinery and supervised the drafting department.

In 1915 Mr. Thompson returned to the United States and took charge of the drafting department of the Adder Machine Company, Kingston, Pa., collaborating in the design of the Wales Adder Machine. The following year he became factory manager for Edward J. Darby & Son, Philadelphia, in full charge of manufacturing, and designing and supervising art metal work. In 1917 he was associated with Simon Zinn, Inc., New York, as superintendent, laying out new work and supervising drafting work.

During the World War Mr. Thompson was in charge of the Trench Warfare Section of the Ordnance Department in New York. For several years after the war he was general manager for the Empire Tube and Steel Corporation, College Point, L. I., N. Y.

Mr. Thompson became an associate-member of the A.S.M.E. in 1918.

Hermann S. Trabold

Hermann S. Trabold, an associate member of the A.S.M.E. since 1921, died on August 4, 1929, following an operation for gall trouble.

Mr. Trabold was born on April 17, 1891, in Brooklyn, N. Y. His parents were William G. and Mary Baker Trabold. He attended high school in Hackensack, N. J., and was graduated from Stevens Institute of Technology with an M.E. degree in 1914. For the first year following graduation he was engaged in designing and testing centrifugal pumping machinery for the Holland Machine Company, at South Norwalk, Conn. He then spent three years with Cyrus Currier & Sons, Newark, N. J., working on the design of miscellaneous machinery and machine parts.

In 1917 Mr. Trabold became connected with the Hyatt Bearings Division of General Motors Corporation, as chief draftsman and assistant to the plant engineer. He was in charge of the design of buildings, gas and power plant alterations, and rearrangements and additions to the plants. From 1919 to 1921 he was chief draftsman in the Boiler Division of the Engineering Department of Newburgh, N. Y., and from 1921 to 1928 was production superintendent of the National Oven Company, with office in New York, and factory at Glenham, Dutchess County, N. Y. Since May, 1928, he had been engineer for the Smoot Engineering Company in New York, N. Y.

Mr. Trabold married Edna L. Williams, of Newburgh, N. Y., in 1921, and is survived by her and by one son, Hermann S., Jr.

Henry Augustus Tuttle

Henry Augustus Tuttle, whose death occurred on August 28, 1929, at Upton, Mass., was born in Galesburg, Ill., on April 14, 1863, the son of Lemuel Wells and Phoebe A. (Phelps) Tuttle. He studied drafting and machine design with a private tutor, and for about ten years engaged in experimental work for Pratt & Whitney Mfg. Co., Hartford, Conn., Brown & Sharpe Mfg. Co., Providence, R. I., and Yale & Towne Mfg. Co. and Blickensderfer Typewriter Company, Stamford, Conn.

In 1893 Mr. Tuttle opened a shop for general and special machine work at Stamford. Three years later he became chief engineer for the Evans Stamping & Plating Co., at Taunton, Mass. The products manufactured by this company were patented by Mr. Tuttle. He retired from active business in 1917 and since then had only served in a consulting capacity to the Paragon Gear Works, of Taunton. Among his patents were those on the Tuttle tapping machine, Tuttle reverse gear, and Paragon reverse gear.

Mr. Tuttle became a member of the A.S.M.E. in 1914, and also was a member of the Society of Automotive Engineers and a Mason. Surviving him are his widow, Jennie L. (Cobb) Tuttle, whom he married in 1885, and one daughter, Alice Tuttle Colcord.

Carl J. Ulmann

Carl J. Ulmann was born at Fuerth, Bavaria, on May 10, 1863, the son of Moritz and Doris Kleefeld Ulmann. He was educated in the schools there

and at Nuremberg, Germany, and at the Polytechnicum in Karlsruhe, Germany, and Zurich, Switzerland, receiving an M.E. from the latter in 1882.

After a year in electrical work at the Zurich laboratory, Mr. Ulmann came to the United States and secured work as a draftsman in central station work for Thomas A. Edison in New York. In 1884 he entered the Buffalo machine shops of the Erie Railroad, and in the following year took up tool design with the Brown & Sharpe Manufacturing Company, Providence, R. I. Subsequently he worked as chief draftsman for the Harris-Corliss Engine Works and the American Screw Company, of Providence. In 1888 he returned to New York and took charge of textile manufacturing for Bernhard Ulmann & Co., with which he remained until his retirement from business in 1914.

Mr. Ulmann took out a patent for a chair and also one for a device for winding yarn, the rights to which he sold to the Clark Thread Company in 1921. Since his retirement he had worked on billing machine improvements and other designs. He had also devoted much of his time to literary and artistic tastes and philanthropic work. He translated and edited an old family "chronicle" dating back to 1803, which was privately published. His death occurred on January 3, 1929, at his home in New York.

Mr. Ulmann became a member of the A.S.M.E. in 1886.

He is survived by his widow, Jenny B. Ulmann, whom he married in 1900, and by two daughters, Gene Ulmann and Doris Ulmann Grunebaum.

David Van Schaack

David Van Schaack, director of the Bureau of Inspection and Accident Prevention of the Aetna Life Insurance and affiliated companies, died at Hartford, Conn., on November 13, 1929, as a result of heart failure following an illness of only a few hours' duration.

Mr. Van Schaack was born at Hudson, N. Y., in 1869, coming of an old Dutch family which was identified with Kinderhook, N. Y. He was educated at Kinderhook Academy and Phillips Exeter, and was a graduate of Trinity College, with an A.B. degree, in 1891. Shortly after graduation, he engaged in editorial work on the *New York Sun* under the late Charles A. Dana. In 1897 he went to Hartford and joined the staff of the Hartford *Telegram*, remaining there three years. It was in 1900 that he first entered the insurance business. He spent three years with the Aetna Life Insurance Company, Hartford, and three more in the agency department of the Connecticut General Life Insurance Company.

He returned to the Aetna Life in 1906 when he organized its Publicity Department, of which he was director and, for some time, was also editor of the Aetna Magazine. In 1907 he undertook supervision of the Inspection Department as well. It will be noted that his interest in accident prevention thus preceded by several years the development of the safety movement. He was a pioneer in this field and his "Safeguards for the Prevention of Industrial Accidents" and "Woodworking Safeguards," published in 1910 and 1911, were two of the earliest books in the English language on safety work.

Mr. Van Schaack was a trustee of the Automobile Accident Prevention Fund of the National Bureau of Casualty and Surety Underwriters and a member of its Engineering Committee. He was also a member of the Advisory Committee of the Insurance Federation of America, Inc., a member of the Engineering Committee of the Massachusetts Automobile Rating and Accident Prevention Bureau, and a member of the Casualty Council of Underwriters' Laboratories.

While to those in the insurance business Mr. Van Schaack may have been best known through his able administration of one of the earliest and most successful casualty inspection and accident prevention departments, his activities were wide and varied. He took part in the first National Safety Congress, held in 1912, and was a member of the original committee appointed by the American Institute of Iron and Steel Electrical Engineers to create a national body to promote accident prevention. He was thus identified with the National Safety Council from its earliest beginnings and thereafter always occupied in it a position of trust and importance. No other man contributed more to its growth and ultimate success. He was twice elected president and served

as a member of its Executive Committee from 1913 until his death. As vice-president, he was at various times in charge of public safety, public relations, and finance. He was a member of the American Society of Safety Engineers and had much to do with the affiliation of that body with the Engineering Section of the Council. His sudden death interrupted his work as Chairman of the Council's special committee on Accident Prevention Progress and Possibilities—a work of fundamental importance requiring that expert administration of which he was so capable.

During recent years Mr. Van Schaack had taken an active interest in the affairs of the American Standards Association. He had been a member of its Standards Council since 1922 and was Chairman of the Safety Code Correlating Committee, which he had recently reorganized to undertake a searching investigation of the scope, utilization, and promotion of safety codes. He was a member of the Elevator Code Committee of The American Society of Mechanical Engineers and was a trustee of the American Museum of Safety. He became an associate of the A.S.M.E. in 1918.

While his earlier interest in the safety movement was confined to the industrial field, he soon achieved prominence among those interested in the prevention of public and home accidents, not only in the National Safety Council but in other organizations. He was active in the National Conference on Street and Highway Safety and was appointed by Herbert Hoover, then Secretary of Commerce, a member of the Committee on Traffic Control and the Committee on Causes of Accidents. He was serving as a member of the Advisory Council of the Governor's Safety Committee of the State of Massachusetts.

In the passing of Mr. Van Schaack, the safety movement lost one of its largest contributors and most outstanding figures. His work was characterized by keen vision, cool judgment, and a masterly handling of the situations which confronted him. As a speaker, he was clear and forceful, but it was in his ability to supervise a meeting or a committee, or to conduct the administrative duties with which he was charged, that he particularly excelled.

He was socially minded and maintained a lively interest in human affairs and in books, the theater, golf, automobiling, and yachting. But his heart was in the safety movement; he believed in its ultimate success and stimulated others to believe as he did.

Claud Alven Vicklund

Claud Alven Vicklund, who died at St. Luke's Hospital, Denver, Colo., on December 8, 1929, after a three weeks' illness, was born in that city on March 3, 1897. He was graduated from South High School in 1915. A scholarship to the University of Colorado was awarded him and he received his B.S. degree in mechanical engineering from that institution in 1919. During his years in high school and college he spent several summer vacations in the employ of the Denver Rock Drill Mfg. Co.

He enlisted in the engineering division of the army in 1918. After the war he was connected with the Great Western Sugar Company at Fort Collins, Colo., as mechanical student for a year, and subsequently was employed by the Stearns-Rogers Mfg. Co., Denver. At the time of his death he was traveling engineer for John A. Roebling & Sons Co.

For three years he was instructor in special engineering work at the University of Colorado. He was actively interested in engineering and construction projects throughout the state.

Mr. Vicklund was a member of the American Association of Stationary Engineers and National Engineers Craftsmen, and had been a junior member of the A.S.M.E. since 1920. He also belonged to the Masonic fraternity.

Surviving him are his parents, Mr. and Mrs. Erick Vicklund, and a brother, Enoch Vicklund, all of Denver.

Albert E. Walden

Albert E. Walden, former chief engineer and executive of the Baltimore County Metropolitan District, Baltimore, Md., was born at Rockland, Me.,

on August 18, 1872, the son of Edward H. and Aliva (Packard) Walden. He supplemented his public school education with business college and correspondence school courses and evening instruction under a private tutor, covering general technical subjects.

His experience from 1886 until his retirement on account of ill health in April, 1929, covered every phase of public service. He designed, directed the construction, purchased and installed the equipment, and supervised the operation of steam power, electric light and power, water power, and gas plants, and distributing systems. He installed both underground and surface electric railway lines and electrified existing lines. He developed water supply and sewerage systems serving large territories.

His activities took him into many sections of the United States and he acquired a thorough knowledge of the details of electrical and hydraulic engineering. Among the equipment designed by him is a portable standard test meter for testing water meters in place, which is used by many companies and public service commissions.

Since 1906 Mr. Walden had been located in Baltimore, Md. For fifteen years he was superintendent, chief engineer, and purchasing agent for the Baltimore County Water & Electric Co. Subsequently, he served the city in the consolidation of several public utility properties for municipal control. His work for the Baltimore County Metropolitan District under the County Commissioners included the accounting and engineering problems in connection with the expenditure of more than four million dollars for the development of the water supply and sewerage system of the district.

Mr. Walden was familiar with the systems of uniform accounts recommended by the National Electric Light Association, American Gas Light Association, American Water Works Association, and American Street Railway Association. He was frequently called upon for appraisals and reports on the cost of operation of public utility properties and industrial power plants. A great deal of this work was done by him after he went to Baltimore, as a member of the firm of Wehr & Walden.

Mr. Walden had contributed papers to the technical press, including articles on the construction of electric and gas driven pumping stations, water purification using ozone gas, engine cylinder lubrication, and the extraction of oil from steam. He became a member of the A.S.M.E. in 1913, and also belonged to the American Institute of Electrical Engineers, the American and New England Water Works Associations, the Iron and Steel Electrical Engineers, the National Electric Light Association, and the American Street Railway Association.

The death of Mr. Walden occurred on August 26, 1929. Surviving him are his widow, Jessie V. (Boomhower) Walden, whom he married in 1894, and two sons, Robert R. and Frederick P. Walden.

Leonard Waldo

Leonard Waldo, consulting metallurgical and electrical engineer, died at his home in Plainfield, N. J., on January 25, 1929.

Dr. Waldo was born in Cincinnati, Ohio, on May 4, 1853, the son of Dr. Frederick Augustus and Frances (Leonard) Waldo. He received a B.S. degree from Marietta College in 1872, an A.M. degree five years later, and an honorary D.S. in 1927. He also studied at the Columbia School of Mines.

In 1874 he was sent as assistant astronomer on the United States Transit of Venus Expedition to Tasmania and upon his return was connected with the Harvard Observatory. In 1879 he was placed in charge of the Horological Bureau of Yale University. Harvard conferred the degree of Doctor of Science upon him in 1879 and Yale an honorary A.M. the following year.

Dr. Waldo left Yale in 1888 to become consulting engineer for the United States Steel Corporation. Among other connections he was secretary of the Waldo Foundry, Bridgeport, Conn.; a member of the firm of Sprague, Duncan & Hutchison, New York, N. Y.; general manager of the Cowles Elec. Smelting Co., Bridgeport; senior member of the firm of Waldo & Sperry; and technical engineer and adviser for the Fairbanks Company; and had been associated with the Gillette Safety Razor Company and the Rumford Metal Company.

During the World War, Dr. Waldo was consulting engineer for the War Department in the production of illuminants and shells, and was connected with the experimental department of the Nixon Nitration Works of Raritan, N. J. He also conducted important tests at Aberdeen, Md., the Lakehurst Proving Grounds, and in his own Plainfield laboratories.

In recent years he had conducted extensive research on atomic structure. He was the inventor of the magnesium production process.

Dr. Waldo became a member of the A.S.M.E. in 1894, and served on its Library Committee from 1907 to 1916, for five years of that time as chairman of the Committee. He was also a member of the Fatigue of Metals Committee of the National Research Council. He was a medallist of the Royal Society of Arts. Among other scientific societies to which he belonged were the American Institute of Mining and Metallurgical Engineers, the American Institute of Electrical Engineers, the Society of Chemical Industry, the Iron and Steel Institute, and the Microscopical Society. For many years he served on the Membership Committee of the Engineers Club of New York, and recently was made a life honorary member of the club.

Dr. Waldo gave much of his time and thought to furthering the interests of Plainfield, where he had lived for nearly thirty years. His efforts were largely instrumental in securing for the city its present Carnegie Library building, and he spent many hours in building up the scientific and music department of the library. He was a charter member and vice-president of the Plainfield Symphony Society and played the violincello in the orchestra. He was for many years a member of the Crescent Avenue Presbyterian Church of Plainfield.

Dr. Waldo married twice, his first wife being the former Miss Dora Fullerton of Philadelphia, who died in 1886. He is survived by his second wife, formerly Miss Ada Louise Purdy, of New York, N. .Y., and by four daughters and one son.

Worcester Reed Warner

An outstanding personality has been lost to the engineering profession through the sudden death of Worcester Reed Warner, which occurred in the ancient town of Eisenach, Saxe-Weimar, Germany, on June 25, 1929. Mr. Warner left his home in Tarrytown, New York, early in May on his nineteenth European trip. The end came most unexpectedly, being due to shock. Mrs. Warner and his daughter Helen were with him.

Mr. Warner—with his almost life-long associate Ambrose Swasey—was a founder of a concern known the world over as builders of accurate production machine tools, of some of the largest astronomical telescopes and mountings, and of other instruments of precision. With Ambrose Swasey he also shared the distinction of having been one of the original members of The American Society of Mechanical Engineers as well as Past-President and Honorary Member of the Society. It is indeed a pity that Mr. Warner was not spared for another year to participate in two events toward which he eagerly looked forward—one the fiftieth anniversary of The American Society of Mechanical Engineers, and the other the fiftieth anniversary of The Warner & Swasey Company.

Worcester Reed Warner was born on a farm near the little village of Cummington, on the eastern slope of the Berkshires, between Northampton and Pittsfield, Massachusetts, on June 16, 1846. Like the poet William Cullen Bryant who was also born in Cummington, Worcester Warner was of Mayflower ancestry, and the home farm had been cleared in the forest by four generations of Warners—among them a captain in the Revolutionary Army. Worcester Warner's father, Franklin J. Warner, was a more than ordinarily prosperous farmer, and Worcester evidently inherited his business ability from him. The mother, Vesta Wales (Reed) Warner, was a lover of books dealing with science, and had a marked taste for mechanical things. It is equally evident that Worcester inherited his mechanical ability from his mother, and that he drew his early inspiration in science from his mother's books.

The boy attended a district school in Cummington, and at the same time he had a contract with the school committee to build fires in the schoolhouse

stove at eight o'clock every morning—the pay for this being $2 per term. This money went toward experiments carried on in a shop over his father's carriage shed. Among his early productions in this shop was a lathe built from odds and ends. In school he showed a keen dislike for the study of grammar, but an equally keen satisfaction in the study of history and of mathematics. At the age of nineteen he completed his schooling with a three-month term under G. Stanley Hall, who was then a student at Williams College and who was during the last twenty-five years of his life president of Clark University in Worcester.

Worcester Warner had no liking for farming as a life work, so in the autumn of 1865 he set out for Boston, having saved up money enough to pay his fare. While visiting his uncle Worcester he saw a four-line advertisement by the American Safety Steam & Engine Company calling for a boy to work in the drafting room. He answered this, and being a green country boy he was disheartened to find about a hundred rather dapper city boys waiting in line. In spite of this George B. Brayton, the engineer, was attracted by the tall country boy, and after asking him some mechanical questions, he hired him for $5 per week—to the surprise and somewhat to the disgust of the president of the company, who evidently gaged boys by other standards.

In the spring of 1866 the offices were removed to Exeter, New Hampshire, and Mr. Brayton—who had cultivated Worcester Warner's acquaintance, much to the boy's advantage—took him along. There he worked in the shop as well as in the drafting room and office—still at $5 per week—and there he first met Ambrose Swasey, whom he described as "the brightest of the lot." After two years Ambrose Swasey went to the Grant Locomotive Works in Paterson, N. J., but becoming thoroughly homesick and discouraged there, he returned to Exeter. The two boys then decided to start out together, and after writing letters to several concerns they went to the Pratt & Whitney Company in Hartford, Conn., in the spring of 1869, and after Amos Whitney took them through the plant they went to work there.

In spite of the fact that there were some five hundred young men ahead of them, it was not two years before Warner and Swasey were given positions as foremen. Mr. Warner eventually had charge of the gear-cutting department, while Mr. Swasey had charge of a machine-tool-building department, and both engaged in an activity called "contract work," which played a large part in developing individual manufacturing talent in the old New England shops. Under this system the company furnished the men and the materials, and charged the labor against the contract. If the job was finished at a cost less than the contract, the contractor pocketed the difference as his profit. Otherwise the loss was charged against the next profit. The successful contractor had to be a close estimator, an able handler of men, and a good mechanic. Warner & Swasey were notably successful in contracting, and though neither drew over $3 per day as salary, they managed to accumulate a joint capital of $12,000 during their eleven years with Pratt & Whitney.

Worcester Warner had a remarkable ability for making acquaintances, and his personality and appearance led to his being given charge of the Pratt & Whitney machinery exhibition in Boston in 1873. By the judicious operation of a fast screw machine next to an aisle, and by the liberal distribution of samples of its work, Mr. Warner kept a crowd around the exhibit and had the satisfaction of wiring to the plant, "You are awarded the first and only gold medal." He was later given charge of the company's exhibit at the Centennial in Philadelphia, spending six months on that assignment. It was during his later days with Pratt & Whitney that Mr. Warner made his first trip to Europe, taking a leave of absence in 1878 to do this His uncanny ability to "get into places" was demonstrated on the trip when Charles Churchill & Company were unable to get him a pass into the famous Whitworth works, upon which he went to Newcastle "on his own" and so impressed the Whitworth officials that they conducted him through the whole "forbidden" plant.

In 1880 Worcester Warner and Ambrose Swasey decided to leave the Pratt & Whitney Company in order to establish a machine business of their own in the Middle West, where they felt there was a splendid field for such a business. With their joint assets of $12,000 they first tried to make a start in Chicago, but soon discovered that they were too far west to get the neces-

sary skilled mechanics for a project such as theirs. They then investigated Cleveland, and being convinced by men like Thomas White, the sewing-machine manufacturer, that this growing industrial city was the ideal place for them, they established themselves there in 1881, building the first part of their present plant "way out in the country," now known as Carnegie Avenue near 55th Street. In those days the Euclid car line (horse cars) ended at 55th Street, and the two partners used to shoulder shaft hangers, boxes of bolts, etc., to carry them over to the new plant. In addition to their own $12,000 they borrowed $7000 from a willing Cleveland bank before their business got under way, and that was the only borrowed capital that they ever needed.

From that day to this the Warner & Swasey Company has been widely known in two seemingly entirely unrelated fields—turret lathes and astronomical telescopes. Worcester Warner drew his first astronomical inspiration from a book by Prof. C. M. Mitchell, called "Planetary and Stellar Worlds," which was presented to him by his parents. During his years at the Pratt & Whitney works he continued his astronomical studies with avidity, and became decidedly more than an amateur builder of telescopes. He was convinced that due to the size of telescopes, they had outgrown the "laboratory apparatus" type of mounting, and he proposed to have his company build instruments which should be real engineering structures, rigid in support, yet precise in their motions and convenient in their control. That his theory was sound is indicated by a brief mention of the Warner & Swasey achievements in this direction, such as: the 36-in. Lick telescope, the 40-in. Yerkes telescope, the 72-in. telescope for the Dominion of Canada, the 60-in. telescope for the Argentine National Observatory, etc. Their range finders, gun sights, field telescopes, etc., made for the United States Government were equally successful. The same stamina and precision were built into their machine tools, and in no small measure their widespread introduction into metal-working plants was due to the personality and business acumen of Mr. Warner. It is a remarkable example of the trust of one man in another that for twenty years Warner and Swasey conducted their business without any form of written agreement. The Warner & Swasey Company was incorporated in 1900, and these incorporation papers actually constitute their first written agreement. Mr. Warner served in various executive positions, including the presidency and the chairmanship of the board of directors.

In addition to his outstanding success as an engineer and manufacturer, Mr. Warner—during his thirty years of residence in Cleveland—became one of the leading men of that city in civic and financial affairs. He served as a director of the Guardian Trust Company, and of the Society for Savings; as a trustee of Western Reserve University and of Case School of Applied Science; as one of the early presidents of the Cleveland Chamber of Commerce and of the Civil Engineers' Club (now the Cleveland Engineering Society); and he was a member of the Union Club and of the University Club. In 1890 Mr. Warner married Miss Cornelia F. Blakemore, of Philadelphia, who was an able and popular associate in all of his activities from that time on. Mrs. Warner and their daughter, Miss Helen B. Warner, survive him.

To attempt to enumerate Mr. Warner's many benefactions is nearly as difficult as to enumerate the honors which he received for his attainments. He contributed liberally to educational institutions, and to churches, and among his contributions to the Cleveland Museum of Art is his collection of rare Chinese porcelains and other curios garthered during his travels. It may be fitting to mention here that Mr. Warner retired from active business in 1911, at the age of sixty-five, and was thereby able to devote the remaining eighteen years of his life to his favorite studies and to travel. At the time of his retirement he removed from Cleveland to his beautiful estate, Wilson Park, at Tarrytown, New York, where he maintained a fine private observatory and experimental workshop, and where he and Mrs. Warner did much entertaining. He never forgot his birthplace, and throughout his life he visited the isolated village of Cummington at least once a year. He not only gave the village a water system, but a fine Community House as well, and he helped to maintain a woodworking plant upon which the village depends to a considerable extent.

Mr. Warner was a fellow of the Royal Astronomical Society, and a member of the British Astronomical Society, the American Association for the Advancement of Science, and the Engineers' Club of New York. In 1897 he

was given the degree of Doctor of Mechanical Science by the Western University of Pennsylvania, and in 1925 that of Doctor of Engineering by Case School of Applied Science.

Mr. Warner might almost be called one of the traditions of the A.S.M.E. He became a member of the Society in 1880—at its very beginning—and for forty-nine years he was a familiar and welcome presence at headquarters, at meetings, at the banquets, and on excursions. He personally knew literally hundreds of members, both old and young, and served as a fine inspiration toward what it is possible for an engineer to be. It is all too little to say that for years to come this genial presence will be profoundly missed in Society affairs. Worcester Reed Warner gave liberally of his time and of his talents in promoting the welfare of the A.S.M.E. He served as a Manager in 1890-1893, and as President in 1897. In 1925 the Society had the privilege of creating him an Honorary Member, at which time Herbert Hoover was likewise recognized for his engineering achievements.

Worcester Reed Warner takes his place in history with such noted machine builders as Henry Maudslay, James Nasmyth, and Coleman Sellers. Like them he made headway in his chosen profession largely through his own efforts. Like them also he proved that a man might be practical and at the same time be a scientist. Like them also he proved that a good engineer is not necessarily a poor business man, and he showed how wealth may be so applied as to bring happiness and respect to the individual and good to the world in general.—GUY HUBBARD.

Hal C. Weaver

Hal C. Weaver, professor and head of the department of mechanical engineering at the College of Engineering of the University of Texas, at Austin, died suddenly at his home on January 12, 1929, of angina pectoris. He had spent twenty years in the service of the University, advancing from the position of tutor to that of full professor.

Professor Weaver was born on November 1, 1893, at Chester Station, Eaton County, Mich. He received his early education in the schools of Charlotte, Mich., attended Michigan Agricultural College for one year, and then entered the University of Michigan, where he received the B.S. degree in mechanical engineering in 1908. In the fall of that year he became tutor in electrical engineering at the University of Texas, and while acting in that capacity, pursued courses toward a B.S. degree in electrical engineering, which he received in 1912 from the University of Texas. The same institution awarded him an E.E. degree in 1913, and in 1926 he received his master's degree in mechanical engineering from the University of Michigan. He did graduate work in internal-combustion engines and refrigeration at the University of Wisconsin in the summer of 1923.

During his undergraduate days Professor Weaver accumulated practical experience in various lines. In the summer of 1903 he served as assistant to the city engineer of Charlotte and during the following summer assisted in the Battle Creek Drainage Survey. In 1905 and 1906 he was draftsman with the Olds Motor Works of Lansing, Mich., and the Dolson Automobile Company, at Charlotte. Other concerns with which he was connected subsequently were the Kneal & Ryan Construction Co. and Riggs & Sherman Construction Co., both of Charlotte, the Cadillac Motor Car Co., as sub-agent and salesman in Eaton County, Mich., and the Westinghouse Machine Company, East Pittsburgh, Pa., in the steam turbine testing department.

The subjects which he taught during his life at the University of Texas included steam and gas engineering, thermodynamics, power plant economics and power plant design, manual training and engineering shop work, refrigeration, heating, and ventilation.

During the World War Professor Weaver was head of the Engines Division and member of the Academic Board of the U. S. Army School of Military Aeronautics for a year, and then president of the Academic Board of the U. S. Army School of Automobile Mechanics at Camp Mabry. He was also a member of the Board of Control of the War Schools of the University of Texas. This work entailed the design and construction of physical plants, purchase of equipment and supplies, organization of large students bodies, supervision of faculties, and installation of efficiency and grading systems.

After the War Professor Weaver devoted himself to the upbuilding of the mechanical engineering department, of which he had been head since its establishment. His last outstanding contribution to this development was the designing of the new University Power Building, completed in the spring of 1928.

Outside of these activities he acted as consulting engineer on power plant and water supply questions in Austin and other Texan cities.

Professor Weaver became a member of the A.S.M.E. in 1920. He also belonged to the University of Texas Science Club, the Masonic fraternity, and other fraternal organizations. He was a member of the Presbyterian Church. He is survived by his widow and by two daughters, Margaret and Helen.

Robert Weeder Weidenbacker

Robert Weeder Weidenbecker, a member of the foreign sales organization of The Baldwin Locomotive Works and a former editor of *Baldwin Locomotives*, died on April 29, 1929.

Mr. Weidenbacker was born in Philadelphia, Pa., on July 19, 1888. His early education was received in the public schools at Ardmore, Pa. He studied engineering in the evening classes of the Franklin Institute and the Drexel Institute, both of Philadelphia, and took a business course with the Alexander Hamilton Institute. After working for a time in the automobile industry, Mr. Weidenbacker entered the college apprenticeship course at The Baldwin Locomotive Works in 1909. In 1912, upon the completion of his apprenticeship, he was transferred to the engineering department. He spent about two years as technical adviser to the agents of the company in Brazil and several years in the design and specification work of the department.

Mr. Weidenbacker was transferred to the foreign sales department in 1919. The following year he made a special survey in the Balkan States, and then was sent to the London office, as assistant to the manager. At the time of his death he was in charge of the Calcutta office.

Mr. Weidenbacker became a junior member of the A.S.M.E. in 1912 and was promoted to associate membership in 1921. He was also a Fellow of the Royal Society of Arts, in London.

Mr. Weidenbacker is survived by his widow, Evelyn (Bewers) Weidenbacker and two children, a son and a daughter, and by his mother, Mrs. George W. Weidenbacker, of Haverford, Pa.

Frederick Latimer Wells

Frederick Latimer Wells, a member of the A.S.M.E. since 1892, was born in Chicago, Ill., on July 9, 1860. He took special studies in hydraulic engineering and gained his early experience at the Wells Steam Pump Works, Chicago, of which he became superintendent and manager in 1882, having charge of the shop and engineering departments. He continued the practice of engineering in Chicago until his death on December 9, 1929.

Mr. Wells also belonged to the Illinois State and the Chicago Historical Societies, The Sons of the American Revolution, the Chicago Yacht and Golf Clubs, and other social organizations. He was a governing member of The Art Institute of Chicago.

His wife was Katharine S. Adams, of Wheaton, Ill.

Henry William Wendt, Sr.

Henry William Wendt, Sr., a leader in the heating and ventilating industry, was born at Buffalo, N. Y., on June 19, 1862. He was the son of William F. Louise (Weickman) Wendt.

Mr. Wendt was educated in the public schools of Buffalo and during his entire business life had been connected with the Buffalo Forge Company, which was established by his brother in 1878. After serving an apprenticeship Mr. Wendt was placed in charge of the manufacturing activities and made a partner in the concern.

In 1910, when the copartnership was dissolved and a corporation formed, he was made secretary and treasurer, later becoming vice-president, and in 1916 president of the company.

A great many inventions of practical value have been placed to the credit of Mr. Wendt, and to an unusual degree he possessed the combination of an inventive mind with a sense of practical value. His frequent improvements in methods and equipment played an important part in making his company one of the largest of its kind in this country.

This company, which in its early days manufactured blacksmiths' forges and other blacksmith shop equipment, later, at Mr. Wendt's suggestion, engaged in the manufacture of fans and heating equipment. For some years Mr. Wendt not only devoted himself to the designing and manufacturing end of the work but also was the company's only salesman for fan equipment. He made a thorough study of this field and his company was the first to publish performance data on the subject for general use. He supported Willis H. Carrier in his work on heating and later on air conditioning, and helped to bring both of these lines nearer to being exact sciences. He was for a time president of the Carrier Air Conditioning Company. When the American Society of Heating and Ventilating Engineers established its Research Bureau and asked industry for help, Mr. Wendt was the first to pledge his support over a term of years and to urge other manufacturers of ventilating apparatus to do the same. This support was never withdrawn.

Mr. Wendt was also president of the Buffalo Steam Pump Company, North Tonawanda, N. Y., The Geo. L. Squire Mfg. Co., Buffalo, manufacturers of plantation machinery, and The Canadian Forge Company, of Kitchener, Ontario. His interest in the employees of all these companies was personal and warm. In 1920 he established a "Baby Check" fund, from which fifty dollars was paid to the mother of each new baby born to an employee. His companies also established group insurance, applied to all employees, besides which it had been his practice for many years personally to duplicate all sick and death benefits paid by the Employees Benevolent Association. He knew many of his employees personally and recognized no distinction of position in his contact with men.

Mr. Wendt was known as an expert foundryman, and in later years was president of the American Foundrymen's Association. He was also the first president of the National Association of Fan Manufacturers, one of the founders of the Hydraulic Association, and a member of the American Society of Heating and Ventilating Engineers, the A.S.M.E., which he joined in 1912, and other engineering and trade organizations. He was a 32nd degree Mason, and a member of the Commandery and Shrine, a former director of the Buffalo Chamber of Commerce, in politics a Republican, and in religion a Presbyterian. He belonged to a number of clubs in Buffalo and his interest in the welfare of the city was evidenced quietly but effectively in many ways. Many individuals, as well as institutions, benefited by his generosity and thoughtfulness.

Besides these interests Mr. Wendt was for a number of years publisher of the *American Blacksmith,* a trade paper, and of *La Hacienda,* an agricultural magazine circulated in Latin-American countries.

Throughout his life he was a lover of the outdoors, of travel, and of animals, particularly horses.

His death occurred at his home in Buffalo on June 12, 1929, following a brief illness of pneumonia. Surviving him are his widow, Edith (Forsyth) Wendt and two sons, Edgar F. and Henry W. Wendt, Jr.

Louis E. White

Louis E. White, vice-president and treasurer of the Gale Manufacturing Company, Albion, Mich, died at Detroit, Mich., on November 3, 1927.

Mr. White was born at Detroit, Mich., on August 21, 1869, the son of Henry Kirke and Christine A. (Fortier) White. He attended the Silig Pension, Vevey, Switzerland, in 1885 and 1886, Dummer Academy of Newburyport, Mass., during the following year, and was graduated from Cornell University with a degree in mechanical engineering in 1894.

His entire business life was spent with the Gale Manufacturing Company, for which he became purchasing agent in 1894. He was made auditor of the

company in 1896, secretary in 1902, treasurer in 1904, and vice-president in 1916. The construction of a large foundry, reconstruction of the entire steam plant and installation of electric instead of steam power, installation of a sprinkler system and auxiliaries, and introduction of fuel oil equipment for the steel forging plant, all came under his supervision in the early days of his connection with the company.

Mr. White became an associate-member of the A.S.M.E. in 1916, and belonged to a number of clubs in Detroit and Albion. He was a Republican and belonged to the Presbyterian Church.

His widow, formerly Miss Blanche V. Harris, whom he married in Detroit in 1894, and one son, Louis H. White, survive him.

Walter A. Windsor

Walter A. Windsor, president of the Marietta Manufacturing Company, builders of steamboats and sea-going vessels, Point Pleasant, W. Va., died on August 20, 1929, in a Cincinnati hospital, following an operation.

Mr. Windsor was born at Marietta, Ohio, on May 23, 1887, the son of Alla and Josephine (Dye) Windsor.

He worked as a machinist while attending the Marietta Academy and Marietta College, from which he was graduated with a B.A. degree in 1910. For the next two years he studied law at Harvard, then after a year in engineering work at Marietta returned to Harvard, where he was given the degree of Bachelor of Laws in 1914.

During his college years Mr. Windsor spent some time in the employ of the Marietta Manufacturing Company, designing engines and miscellaneous machinery for ships, and since 1912 had been president of the company. Among his designs was that for an enclosed valve tandem-compound marine engine.

Since 1918 Mr. Windsor had been president of the Federal Steel Products Company and vice-president of the St. Louis Boat & Engineering Co. and in constant consultation with the engineering department of that company.

As vice-president of the Ohio Valley Improvement Association he was largely responsible for securing funds for the work of the association. He was also president of the Citizens National Bank of Point Pleasant; vice-president of the Gallipolis-Point Pleasant Bridge Company; and a director of the Point Pleasant Bldg. Co., United Oil & National Gas Products Corpn., and Point Pleasant Home Bldg. Co. He had served as secretary of the Marietta Chamber of Commerce and president of the Point Pleasant Chamber of Commerce. He was a trustee of Marietta College.

Mr. Windsor became a junior member of the A.S.M.E. in 1919, and was promoted to full membership in 1925. He also belonged to the Society of Naval Architects and Marine Engineers and the American Iron and Steel Institute.

Mr. Windsor enjoyed outdoor sports and belonged to a number of country clubs. He is survived by his widow, Anne H. (Park) Windsor, whom he married in 1922, and by two daughters, and one son.

Hugo O. Winner

Hugo O. Winner, whose death occurred suddenly from acute indigestion on June 3, 1929, at his home in Glenside, Pa., was born at Philadelphia on November 2, 1879, the son of C. Sivori and Frances Stevens Winner, both of Philadelphia. He attended Temple University and Spring Garden Institute, where he secured shop practice. With the exception of one year when he was located in Pittsburgh with the Westinghouse Electric & Mfg. Co., assisting in the design and detailing of controlling apparatus in the switchboard and control division, his entire business life was spent with Philadelphia concerns.

His first experience was with the Geo. V. Gresson Company, laying out power transmission plants, and designing and detailing special machinery, from 1899 to 1901. The next three years were devoted to the design of special machinery and steel structures in connection with conveying machinery and systems for handling coal, ashes, and other materials, for the Link Belt Company. He was next engaged for two years by the Niles-Bement-Pond Com-

pany, for which he designed machine tools, steam hammers, and hydraulic machinery, had charge of the rebuilding of the plant and rearranging and installing equipment in the machine departments and erecting shop, and making additions to the power plant, including new boilers, engine, generator, and motor installations.

After returning from Pittsburgh in 1907 Mr. Winner accepted a position with Dodge & Day (now Day & Zimmerman), making investigations and analyses of their existing manufacturing plants and planning and designing complete new plants. From 1909 until 1926, he was in charge of the industrial engineering department of Wm. Steel & Sons Co. During the next year he was connected with the Samson Company. At the time of his death he was with Proctor and Schwartz, Inc.

Mr. Winner became a member of the A.S.M.E. in 1924. He also belonged to the Masonic fraternity and St. Paul's Lutheran Church of Glenside.

Mr. Winner is survived by a daughter, Josephine H. Winner, and a sister, Mrs. Julia W. Kirchner.

John Wolff

John Wolff was born on December 10, 1866, in Brooklyn, N. Y., and died at his home in East Cleveland, Ohio, of heart trouble on March 2, 1929. His father was Frederick Nicholas Wolff, of St. Louis, Mo., and his mother Margaret Bechtel, of Brooklyn. He attended a private school in Brooklyn and then entered the Stevens Institute of Technology, from which he was graduated as mechanical engineer in 1888.

Following his graduation Mr. Wolff was draftsman for six months for the United States Electric Company of Newark, N. J. He then became connected with the Edison Electric Illuminating Company, of Brooklyn, with which he remained for ten years as draftsman, inspector, operator, and designer on power plant construction. After a short time with the American Stoker Company he was associated for two years with the Mahoning Valley Traction Company, Youngstown, Ohio, as chief engineer. He then became mechanical engineer for the Cleveland Electric Illuminating Company, and at the time of his death was also serving the company as mechanical superintendent.

Mr. Wolff became a member of the A.S.M.E. in 1915 and contributed a valuable paper describing tests of the pulverized-fuel-fired boilers at the Lake Shore Station of his company to a joint meeting of the Cleveland Engineering Society with the Cleveland Sections of the A.S.M.E. and the American Society of Heating and Ventilating Engineers in 1925. He also belonged to the American Institute of Electrical Engineers and was active in the work of the Prime Movers Committee of the National Electric Light Association. He had received a bronze medal for ten years' service in the National Guard of New York State.

Ashby Woodson

Ashby Woodson, member of the faculty of the Southwestern Louisiana Institute, Lafayette, La., since its first session in 1901, and head of its department of mechanical engineering, died on May 28, 1929, after an illness of three months.

During these twenty-eight years Professor Woodson devoted himself to the upbuilding of the Institute and particularly the mechanical engineering department, which at the beginning offered only a elementary course in manual training and handicraft in wood and iron. Under his direction all of the mechanical equipment for Southwestern was selected and installed, its heating, lighting, and power plants developed, and a sewerage plant designed and constructed. He also designed and supervised the construction of a laundry plant and was its manager for many years. He taught experimental electrical engineering, as well as mechanical engineering, and selected the electrical equipment for the Institute. He always took a personal interest in his students, helped them to obtain employment after graduation, and continued to keep in touch with them so far as possible.

Ashby Woodson was born in Albemarle County, Va., on December 27, 1877, the son of William Lindsay and Betty Sutherland Woodson, both of that county. He was educated at the Miller School, Va., from which he was

graduated in 1895, completing a postgraduate course in 1897. He later studied in summer sessions in Cornell University in 1901 and 1903, and in the University of Tennessee in 1905. He thus had accumulated more than sufficient credits to acquire the degree of Bachelor of Science, which was awarded to him by Southwestern Louisiana Institute, when it became a standard college in 1921. He then did graduate study in Tulane University, obtaining the degree of Bachelor of Engineering in 1923, and the Master's degree in Engineering in 1927. Before going to Southwestern, he was an instructor in Miller School, Va., from 1896 to 1901; and during the period of the World War, was Chief Instructor at Camp Martin, at Tulane University, 1918-1919. He was a member of the A.S.M.E., which he joined in 1926, and of the Society for the Promotion of Engineering Education.

In 1904 he married Miss Louisa Tolson of Lafayette, by whom he is survived.

Robert Elting Wyant

Robert Elting Wyant, who died in his sleep from hardening of the arteries on December 1, 1929, was a native of Orange, N. J., where he was born on February 13, 1868. His parents were Leonard N. and Mary Capen Wyant. He was graduated from Stevens Institute of Technology, Hoboken, N. J., with an M.E. degree in 1889, and for the next fifteen years, with the exception of a year as superintendent of the Colorado Springs Gas & Electric Co., was connected with the Derby Gas Company, Derby, Conn. He designed, built, and operated the original electric light plant and electrical distribution system of this company. He went to New Haven in 1904 as engineer for the New Haven Gas Light Company, and under his direction almost the entire present gas works was built, including two coal-gas and one water-gas plants with necessary coal and coke handling systems and condensing, scrubbing, and purifying equipment, gas holders, boiler house, tar distillation, and aqua ammonia plants and shops.

Mr. Wyant became a member of the A.S.M.E. in 1916. He also belonged to the American Gas Association, Society of Gas Lighting, New England Gas Association, Guild of Gas Managers of New England, and several clubs. He was a member of the Church of the Redeemer (Congregational), of New Haven.

Mr. Wyant married Mary E. Reveley in 1891. He is survived by their son, Robert R. Wyant.

Alfred Halberstadt Wynkoop

Alfred Halberstadt Wynkoop was born in Pottsville, Pa., on July 20, 1867, the son of Colonel John Estill and Anne (Halberstadt) Wynkoop. He completed his public school education at Pottsville and took up the study of law at Princeton University, but was obliged to withdraw when illness of his father, a contractor at that time located in Alabama, made it necessary for him to go there and take charge of the business.

Becoming interested in the work he remained with his father in a general contracting business, their next engagement being the building of the East Park Reservoir in Philadelphia in 1888. Later they engaged in the operation of granite quarries and ore banks in Virginia, and slag and blue stone crushing plants at Port Kennedy, Pa.

In 1899 Mr. Wynkoop became manager of the Philadelphia office of Julian Scholl & Co., where he remained until 1903. He then was made president of the Contractors Equipment Company, also of Philadelphia. From 1906 to 1909 he was general manager of the Advance Equipment Company; from 1909 to 1912, Pennsylvania representative of Charles Longenecker & Co.; from that time until 1915, eastern manager of the Austin Manufacturing Company of Chicago, with offices in New York; and from 1915 to 1919, president of the Ralph R. Lewis Co. In 1919 Mr. Wynkoop became associated with the Advance Machinery Company of Philadelphia, resigning in 1924 to accept a position as mechanical engineer with Henry Levis & Co., where he remained for two years. From then until his death, which occurred on February 22, 1929, he was engaged in the machinery brokerage business in Philadelphia.

In addition to a course in engineering at Drexel Institute, Mr. Wynkoop read extensively on engineering subjects and was intensely interested in the working

principle of every piece of machinery with which he came in contact. He had a broad experience in an advisory and consulting capacity, assisting in the design of steam road rollers and other road-making machinery, and installing and directing crushing and concrete plants.

Mr. Wynkoop became an associate member of the A.S.M.E. in 1920, and had belonged to a number of clubs in Philadelphia. He was a lifelong member of the Trinity Episcopal Church in Pottsville. He liked to hunt and spent many vacations hunting with friends in Pennsylvania, Virginia, and North Carolina. He had his own hunting dogs and for a time horses also. He is survived by his widow, Amanda Jarrett Wynkoop, and by one son, John Estill Wynkoop, 3d.

John Edward Yorkston

John Edward Yorkston, consulting mechanical engineer for the General Electric Company at Schenectady, New York, died suddenly at his office on December 10, 1928, of heart disease.

Mr. Yorkston was born in Glasgow, Scotland, on May 10, 1855, the son of Alexander and Jane (Shearer) Yorkston. He was educated in the Glasgow College of Science and Art and the Andersonian University. He spent five years as machinist apprentice and seven years on machine tools and marine engines. Among the firms with which he was connected in Scotland were the Clarkson Brothers, John Norman & Co., and Barclay & Curle Co., all of Glasgow.

Mr. Yorkston came to the United States in 1881 and prior to his work with the General Electric Company was employed by Clute Brothers, as machinist, for five months; and the Ellis Locomotive Company, as machinist and draftsman, for over twelve years.

Mr. Yorkston's service with the General Electric Company dated from February 12, 1894, when he secured a position as designing draftsman; three months later he was put in charge of the A-C. Drafting Department. In 1902 he was made assistant to J. W. Upp, then engineer in charge of the Drafting Department. Five years later, on January 28, 1907, Mr. Yorkston was made engineer in charge of drafting and late in 1922 he was promoted to consulting mechanical engineer. He was also chairman of the drafting practice committee and a member of the committee on mechanical design.

Mr. Yorkston became a member of the A.S.M.E. in 1912. He also belonged to the American Institute of Electrical Engineers and several local engineering societies. He is survived by his widow, Grace W. L. Yorkston, whom he married in 1924, and by one daughter, Mrs. George Laidlaw, of Erie, Pa.

Robert Edward Zink

Robert Edward Zink, chief engineer of the Hercules Powder Company, Wilmington, Del., died on February 14, 1929, at his home in Wilmington of pneumonia.

Mr. Zink was born at Bridgeport, Conn., on February 22, 1887, the son of Mr. and Mrs. C. E. Zink. After completing his high school education at Bridgeport he studied at Worcester Polytechnic Institute and subsequently at Cornell University, from which he received a degree in mechanical engineering in 1911.

His first engineering experience was secured during his summer vacations, with the Bridgeport Brass Company, as draftsman and field inspector for factory and power plant additions. For two years after graduation he worked for the Fletcher Engineering Company, at Bridgeport, as draftsman and junior engineer on factory and power plant construction. During the next few years he was engaged in design and construction work in Canada for the Dominion Bridge Company, Winnipeg, Manitoba, Canada; the Westinghouse, Church, Kerr & Co. at Winnipeg and Drummondville; and the Hunt Engineering Company, Medicine Hat, Alberta, Canada. This work included the design of a hotel and station, with heating, ventilating, and mechanical equipment, for the Canadian Pacific Railway; and a 3600-kw. power plant for the Canada Cement Company.

In 1915 Mr. Fink took charge of the sulphuric acid plants of the Leonard Construction Company, New York, N. Y. In the next year he went to Palmerton, Pa., as mechanical engineer for the New Jersey Zinc Company, but resigned that position in 1917 to go into service as Captain in the Ordnance Department, and was in charge of designing and testing ordnance equipment.

For a short time after the close of the World War he was connected with the E. I. du Pont de Nemours & Co. as power plant draftsman. He became connected with the Hercules Powder Company as power engineer in 1920 and was promoted to the position of chief engineer in 1928.

Mr. Zink became a junior member of the A.S.M.E. in 1916 and was promoted to full membership in 1925. He is survived by his widow, Adelaide M. Zink and by three children, Robert, Marion, and Theodore.

DEPOSITORIES FOR TRANSACTIONS

DEPOSITORIES FOR TRANSACTIONS

Alabama

Auburn ..... Engineering Library, Alabama Polytechnic Institute
Birmingham ..... Public Library

Arkansas

Fayetteville ..... Engineering Library, Arkansas University

California

Berkeley ..... Library, University of California
Long Beach..... Public Library
Los Angeles ..... Public Library
University of Southern California
Oakland ..... Oakand City Library
Teachers' Professional Library
Pasadena ..... Library, California Institute of Technology
Santa Clara ..... Library, University of Santa Clara
San Diego..... Public Library
San Francisco .... Public Library (Civic Center)
Engineers' Club of San Francisco
Mechanics Institute
Stanford University ..... Library, Stanford University

Colorado

Boulder ..... Library, University of Colorado
Denver ..... Public Library
Fort Collins ..... Colorado State Agricultural College

Connecticut

Bridgeport ..... Public Library
Hartford ..... Public Library
New Haven..... Public Library
Library, Yale University
Waterbury ..... Silas Bronson Library

Delaware

Newark ..... University of Delaware
Wilmington ..... Wilmington Free Institute

District of Columbia

Washington ..... Scientific Library, United States Patent Office
Library of Congress
Bureau of Standards Library
George Washington University
Catholic University

Florida
- Gainesville ..... University of Florida
- Jacksonville ..... Free Public Library
- Miami ..... Public Library
- Tampa ..... Public Library

Georgia
- Atlanta ..... Carnegie Public Library
  Georgia School of Technology
- Savannah ..... Public Library

Idaho
- Moscow ..... University of Idaho

Illinois
- Chicago ..... John Crerar Library
  Western Society of Engineers
  Library, Armour Institute of Technology
  Public Library of Chicago
- Moline ..... Public Library
- Urbana ..... University of Illinois

Indiana
- Evansville ..... Public Library
- Fort Wayne ..... Public Library
- Indianapolis ..... Public Library
  Indiana State Library
- Notre Dame ..... Library, University of Notre Dame
- Terre Haute ..... Rose Polytechnic Institute
- West Lafayette ... Library, Purdue University

Iowa
- Ames ..... Iowa State College
- Des Moines..... Public Library
- Iowa City ..... State University of Iowa

Kansas
- Kansas City ..... Public Library, Huron Park
- Lawrence ..... Library, University of Kansas
- Manhattan ..... Kansas State Agricultural College
- Wichita ..... Wichita City Library

Kentucky
- Lexington ..... University of Kentucky
- Louisville ..... Speed Scientific School
  University of Louisville

Louisiana
- Baton Rouge..... Louisiana State University
- New Orleans..... Howard Memorial Library
  Louisiana Engineering Society
  Public Library

Maine
- Orono ..... University of Maine

Maryland

Annapolis ..... United States Naval Academy
Baltimore ..... Johns Hopkins University
Engineers Club of Baltimore
Public Library

Massachusetts

Boston ..... Northeastern University
Boston Public Library
Cambridge ..... Massachusetts Institute of Technology
Fall River ..... Public Library
Lowell ..... Lowell Textile Institute
Lynn ..... Free Public Library
New Bedford ..... Free Public Library
Springfield ..... Springfield City Library
Tufts College ..... Tufts College
Worcester ..... Worcester Polytechnic Institute
Free Public Library

Michigan

Ann Arbor ..... University of Michigan
Detroit ..... Public Library
Cass Technical High School
Highland Park Public Library
Flint ..... Public Library
Grand Rapids..... Public Library
Jackson ..... Public Library
Lansing ..... Michigan State College

Minnesota

Duluth ..... Public Library
Minneapolis ..... University of Minnesota
Minneapolis Public Library (Engineering & Circulating Libraries)
St. Paul..... James Jerome Hill Reference Library

Mississippi

Columbus ..... Mississippi Agricultural & Mechanical College

Missouri

Columbia ..... University of Missouri
Kansas City ..... Public Library
St. Louis ..... Engineers Club of St. Louis
Public Library
Washington University
Mercantile Library

Montana

Bozeman ..... Montana State College

Nebraska

Lincoln ..... University of Nebraska
Omaha ..... Public Library

Nevada

Reno ..... University of Nevada Library

New Hampshire

Durham	University of New Hampshire

New Jersey

Bayonne	Free Public Library
Camden	Free Public Library
Elizabeth	Free Public Library
Hoboken	Stevens Institute of Technology
Jersey City	Free Public Library
Newark	Newark College of Engineering
	Free Public Library
New Brunswick	Rutgers University
Paterson	Free Public Library
Princeton	Princeton University
Trenton	Free Public Library

New York

Albany	New York State Library
Brooklyn	Polytechnic Institute
	Pratt Institute
	Brooklyn Public Library
Buffalo	The Grosvenor Library
	Engineering Society of Buffalo
	Buffalo Public Library
Ithaca	Cornell University
Jamaica, L. I.	Queens Borough Public Library
New York	Engineering Societies Library
	Public Library
	College of the City of New York
	Cooper Union
	Columbia University
	N. Y. University Library
Schenectady	Union College
Rochester	Rochester Engineering Society
Syracuse	Syracuse University
	Public Library
Troy	Rensselaer Polytechnic Institute
Utica	Public Library
Yonkers	Public Library

North Carolina

Chapel Hill	University of North Carolina (Engineering Library)
Raleigh	North Carolina State College

North Dakota

Fargo	North Dakota State College
Grand Forks	University of North Dakota

Ohio

Ada	Ohio Northern University
Akron	Public Library
	University of Akron
Canton	Public Library
Cincinnati	University of Cincinnati
	Public Library
	Engineers Club of Cincinnati

Ohio (*cont.*)

Cleveland	Public Library
	Case School of Applied Science
	Cleveland Engineering Society
Columbus	State of Ohio Library
	Public Library
	Ohio State University
Dayton	Engineers Club of Dayton
Toledo	Public Library
	University of Toledo
Youngstown	Public Library

Oklahoma

Norman	Oklahoma University
Oklahoma City	Public Library
Stillwater	Oklahoma Agricultural & Mechanical College
Tulsa	Public Library

Oregon

Corvallis	Oregon State Agricultural College
Portland	Portland Library Association

Pennsylvania

Allentown	Free Library
Bethlehem	Lehigh University
Erie	Public Library
Easton	Public Library
	Lafayette College
Lewisburg	Bucknell University
Philadelphia	Engineers Club
	Drexel Institute
	University of Pennsylvania
	Franklin Institute
Pittsburgh	University of Pittsburgh
	Engineers' Society of Western Pennsylvania
	Carnegie Institute of Technology
	Carnegie Library (Schenley Park)
	Carnegie Free Library of Allegheny
Reading	Public Library
Scranton	Public Library
State College	Pennsylvania State College
Swarthmore	Swarthmore College
Villanova	Villanova College
Wilkes-Barre	Public Library

Porto Rico

Mayaguez	University of Porto Rico

Rhode Island

Providence	Brown University
	Providence Engineering Society
	Public Library

South Carolina

Clemson College	Library, Clemson College

Tennessee
Kingsport .....Public Library
Knoxville .....University of Tennessee
Memphis .....Goodwin Institute
Nashville .....Vanderbilt University

Texas
Austin .....University of Texas
College Station....Agricultural & Mechanical College of Texas
Dallas .....Public Library
El Paso .....Public Library
Fort Worth .....Carnegie Public Library
Houston .....Rice Institute
Public Library
San Antonio.....Carnegie Library

Utah
Salt Lake City....University of Utah
Public Library

Vermont
Burlington .....University of Vermont

Virginia
Blacksburg .....Virginia Polytechnic Institute
Charlottesville ...University of Virginia
Norfolk .....Carnegie Public Library
Richmond .....Virginia State Library

Washington
Pullman .....State College of Washington
Seattle .....Public Library
Engineers Club
University of Washington
Spokane .....Public Library
Tacoma .....Public Library

West Virginia
Morgantown .....West Virginia University

Wisconsin
Madison .....Library, University of Wisconsin
Milwaukee .....Public Library
Board of Industrial Education, Vocational School Library
Marquette University

Wyoming
Laramie .....Wyoming University

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